This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

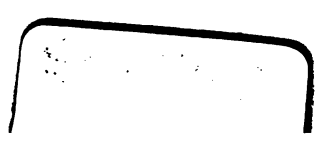
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

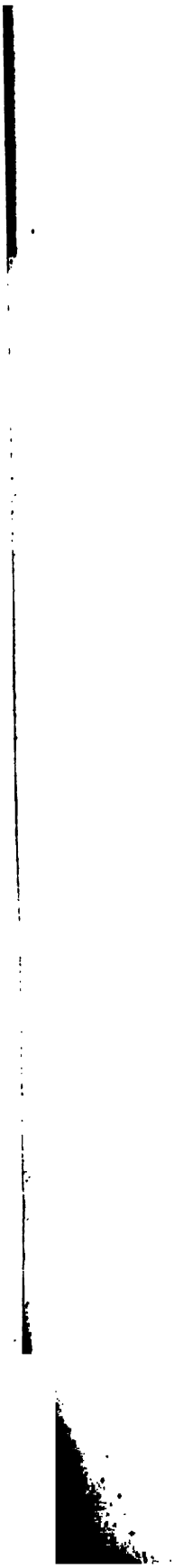
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

N. 1679 d 33





Index Supplement of the Sanitary Record, with Part 14, New Series (Whole No. 275), August 15th, 1880.

THE

Sanitary Record

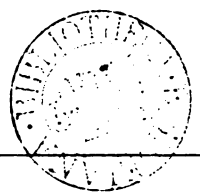
A MONTHLY JOURNAL OF

PUBLIC HEALTH

AND THE

PROGRESS OF SANITARY SCIENCE

EDITED BY ERNEST HART, ESQ.



JULY 1879—JUNE 1880. VOL. I, NEW SERIES.

VOL. XI, OLD SERIES.

LONDON

SMITH, ELDER, & CO., 15 WATERLOO PLACE

1880

LONDON: PRINTED BY
T. RICHARDS, 37, GREAT QUEEN STREET, W.C.

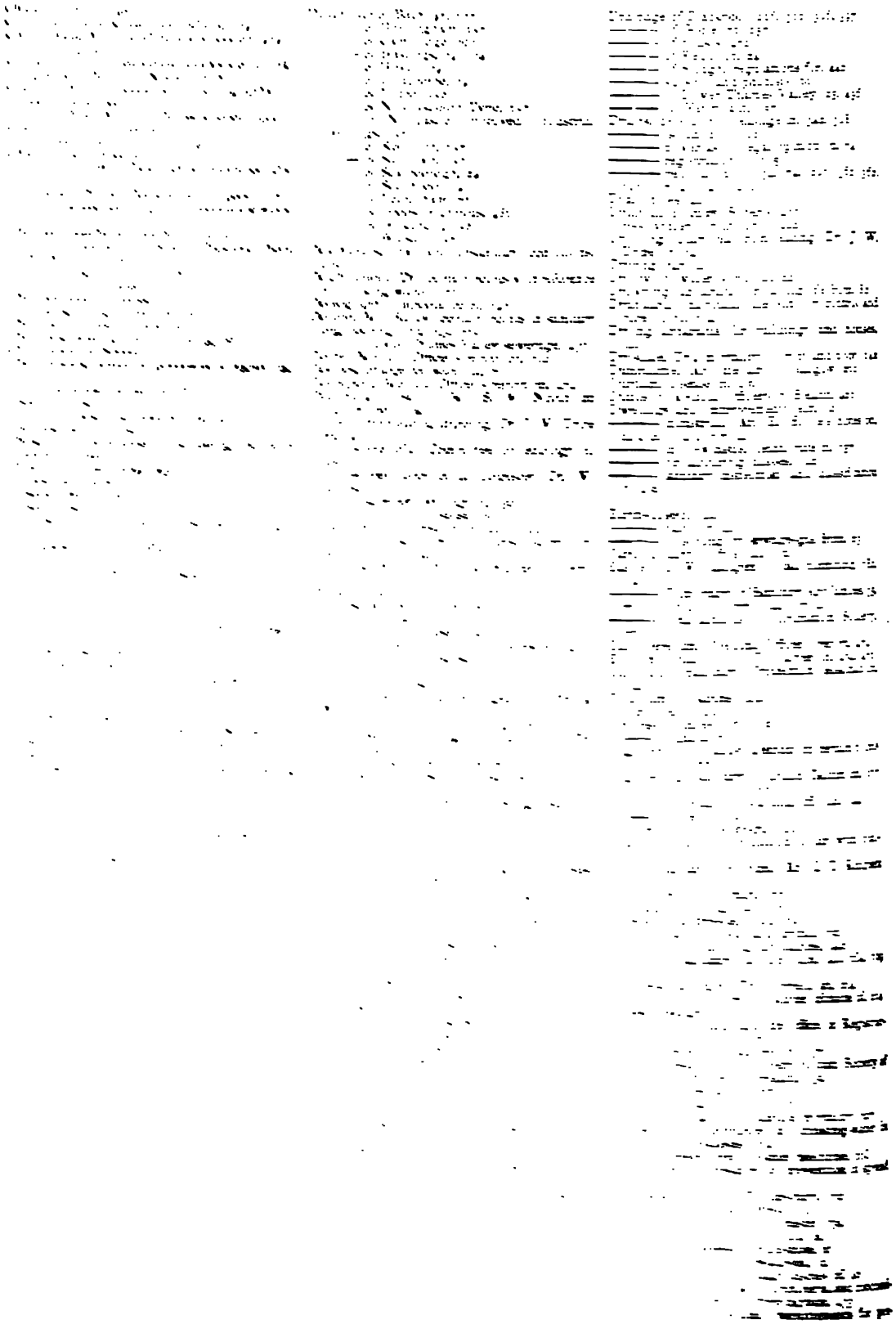
INDEX TO VOLUME I.

(NEW SERIES.)

Abbotsford stove, 199
Abergavenny, Medical Officer's report on, 231
Abyssinian tube-well, 152
Accidents, liability for, 151
——— street, return of, 71
Acids, disinfection by, 221, 317
Action, limit of time for, 32
Adelaide, South Australia, drainage of, 76
Adulteration of bread with alum, 389
——— of food, legal decision on, 478
——— ——— new Act regarding, 153
——— ——— purchase of articles for analysis, 33
——— of milk, detection of, 110
——— heavy fines for, 235
——— report on, 222
Agricultural Society, New Jersey State, exhibition, 482
Air and architects, 23
——— of Glasgow, report on, 261
——— inlets for, Mr. Eassie on, 77, 117
——— outlets for, Mr. Eassie on, 35, 117, 158, 277
——— pollution of with coal-smoke, Mr. C. Estcourt on, 83, 140
——— warmed, delivery of, Mr. Eassie on, 294, 337
Air-diffuser, patent, 151
Alcohol, mortality from, 193
——— in workhouse infirmaries, 20
Alcoholic drinks, French prize on abuse of, 223
Aldershot, water-supply of, 322
Ale brewed with sewage water, 157
Allen, Mr. A. H., Introduction to Commercial Organic Analysis, *rev.*, 155
Altofts, Medical Officer's report, 31
Aluminoferric cake, 150
Ampthill, diphtheria at, 222
Analysis, Commercial Organic, Mr. A. H. Allen's Introduction to, *rev.*, 155
——— cost of an, 233
——— of tea, 357
——— of water, chemical and microscopic, Dr. Notter on, 87; for sanitary purposes, Dr. Swete on, 178
Analyst, public, appointment of, 322
Animal vaccination, 58
Animals, diseased, meat of as food, 317
——— Dr. J. Hardwicke on meat of, 284
Architects and air, 23
Arrears of rates, 74
Arsenic in common things, Dr. Stevenson Macadam on, 375
——— poisoning by from wall-papers, 342
——— proposed prohibition of sale of articles coloured with, 202
Artisans' Dwellings Act, cost of, 71
——— disposal of land, 38
——— Improvement Act, 223
Asbestos gas fires, 199
Ash-closet, 149
Ashantee pocket hammock, 241
Ashby, Dr. H., hot-air chamber for disinfecting clothes, 439
Association, British, for Advancement of Science, meeting of, 109
——— British Medical, Public Medicine Section, 104; programme of Public Medicine Section, 482
——— Early Closing, patrons of, 95
——— Edinburgh Sanitary Protective, meeting of, 434
——— German Public Health, meeting of, 144
——— of Medical Officers of Health, Birmingham and Midland meeting, 311, 434
——— ——— North Western, dairies and milkshops, 41
——— ——— Yorkshire, meeting of, 312
——— Sanitary Officers', meeting of, 390
——— Social Science, president's address, 135
Associations of Medical Officers of Health, North-Western, Northern Counties, and Yorkshire, combined meeting of, 471
Aston rural district, Medical Officer's report, 473
——— Manor, Medical Officer's report, 391
Atchison, Mr. A. T., national water-supply, 140
Automatic ventilators, 42

Baby-farming, 234
Bakewell rural district, Medical Officer's report on, 391
Baking-powder, 234
Balbirnie, Dr., quarters for British soldiers, 197
Ballard, Dr. E., spread of enteric fever by polluted drinking-water, 105
Banner, Mr. E. G., ventilation and sanitation, 202
——— Report on the Improved Ventilation of the Council Chamber, Guildhall. Supplement, March 15, 1880
Barnes, Dr. G. B., gratuity awarded to, 398
Barnsley, sewage-farm, 59
Barnstaple, Dr. J. W. Tripe on winter climate of, 245
Barrett, Mr. R. H., unhealthy houses, 418
Bath, death-rate in, 41, 127
——— small-pox at, 343
——— hot wells of, and their uses, Dr. J. W. Tripe on, 48
Bath, cabinet Turkish, 149
——— portable Turkish, 151
Bath-heaters, 200, 441
Bath-room and lavatory fittings, 151
Baths, gas, 150
——— public, at Birkenhead, 59
——— ——— at Leicester, 76
——— ——— questions on, 147
Bed, patent-folding invalid, 151
Bedford, Medical Officer's report on, 391
Bed-clothes, suffocation by, 185
Bed-rest, 39
Beef and bread, 300
——— Johnston's fluid, 442
Beef-tea, Nelson's, 321
Bells, electric, 149
Belper, Medical Officer's report, 113
Belval, M., international organisation of public hygiene, 142
Berkshire, Medical Officer's report on, 270
Berlin, heating and ventilation of schools in, 59
Bertrand, Dr., lead-colic and gout in sailors, 223
Bethnal Green, Medical Officer's report, 352
Bibliography, 41, 81
Bier, Stretton's folding, 39
Billingsgate market, unwholesome condition of, 322
Bird, Mr. P. H., Cyprus, 397
Bird's custard powder, 321
Birkenhead, Medical Officer's report on, 353
——— public baths at, 56
——— small-pox at in 1877, Mr. F. Vacher on, 372
Birmingham, death-rate of, 157
——— Medical Officer's report, 112
——— sewers in, 398.
Bishop of Manchester's address to Social Science Association, 135
Bisley, Medical Officer's report on, 473
Blackpool, drainage of, 296, 360, 396, 397
Blake, Dr. E. T., ventilation of drains, 34
Blinds, metallic ribbon, 440
Blyth, Mr. A. W., prevention and propagation of diphtheria, 407
Board of Works, Metropolitan, and offensive businesses, 97
——— diseased meat, 316
Boarding and lodging houses, hygiene of, 146
Boards, county, Mr. E. Hart on, 443
——— sewerage powers of, 356
Boiler, crown patent safety, 150
Bolton, compulsory notification of infectious diseases at, 27
——— measles at, 263
——— Medical Officer's report, 113
——— regulation of dairies and cowsheds at, 293
Bond, Dr. F. T., self-acting intermittent syphons, 287
Bonnafont, Dr., improvement of sanitary condition of unhealthy countries, 109
Bootle, Medical Officer's report on, 473
Borrowing powers, 478
Bournemouth, infectious hospital at, 426
Boyle's double action soil-pipe ventilator, 281, 318
Brandon and Byshottles, Medical Officer's report on, 392
Bread, and beef, 300
——— adulteration of with alum, 389
Breakfast, Mr. E. Hart on, 244
Bridge, repair of, legal decision on, 394
Brighton excelsior valveless water-closet and urinal, 152
——— Medical Officers' report on, 313
Bristol, sheep-rot at, 220
Bristowe, Dr. J. S., address to Society o Medical Officers of Health, 192
Britton, Dr. T., a difficulty in water supply, 252
——— so-called typhus fever, 457
Bronchitis kettles, 151
Browning, Dr. B., water as an agent in the spread of diphtheria, 13
Brynmawr, Medical Officers' report, 147
Buchan, Mr. W. P., detection of leakages in drains, 398
——— Plumbing, *rev.*, 275
——— Sunday out, 398
——— trumpet-mouth open ventilators, 116
——— ventilation of drains, sewers, etc., 74, 276, 318, 362, 480
——— ventilation of rooms, 276, 360
Buck, Dr. Albert H., Treatise on Hygiene and Public Health, *rev.*, 315
——— Dr. Elgar, advantage of numbering houses in villages, 12
Buck's patent rain-water percolator, 152
Budd, Dr. W., death of, 264
Budget of the plague, 262
Building appliances, exhibition of, 440
——— by-laws, 60, 210, 393
——— definition of, 356
——— line, legal decision on, 33
——— materials, Mr. E. Hoole on, 323
——— plans, legal decision on, 33
——— Society, Nineteenth Century, 480
——— ventilation of. *See* Ventilation
Burdett, Mr. H. C, unhealthiness of public institutions, 207
——— Pay Hospitals and Paying Wards, *rev.*, 274
Burnham Beeches, purchase of, 38
Burnley, Medical Officer's report on, 313
Burton-on-Trent, Medical Officer's report on, 231
Bury St. Edmunds, Medical Officer's report on, 392
Businesses, offensive, 97
By-laws, building, 69, 210, 393
——— for drainage, 442
Butter, ancient samples of, 301
——— artificial and natural, means of distinguishing, 481

Cabinet Turkish bath, 149
Calcutta, mortality statistics of, 481
Calvert's carbolic acid products, 321
Cambridge, death-rate of, 299
Campbell, Dr. H. F., the Yellow Fever Germ, *rev.*, 396
Canal Boat Act, working of, 252
Canal Boats, returns of registration of, 71
——— unregistered, proceedings against owners of, 216
——— ventilation of cabins in, 22
Carbolic acid, Calvert's products of, 321
——— disinfectants and soap, 152
Carlisle, Medical Officer's report on, 392
Carmichael, Dr., the trap and water-closet system, 352
Carnarvonshire, Medical Officer's report, 271
Carpenter, Dr. A., first principles of sanitary work, 203
——— requirements for prevention of enteric fever, 105
——— ventilation of sewers and soil pipes, 276
Cawd, 224
Cemeteries Act, new, 154
Chadwick, Mr. E., norma of sanitation in school stages of life, 176



Fever, enteric, and fowl-croup, 99
——— ——— influence of drinking-water in originating or propagating, 104, 105
——— ——— from milk-supply, 39, 142, 481
——— ——— prevention of, 185
——— marsh, source of, 262
——— remittent, from impure water, 213
——— typhoid. *See* Fever, enteric
——— typhus, in St. Giles's, 129
——— ——— rapidly fatal case of, Dr. Britton on, 457
——— Yellow, Germ of, Dr. H. F. Campbell on, *rev.*, 396
Field, Mr. Rogers, house-drainage, 472
——— self-acting intermittent syphons, 212, 361
Filters 149, 150
——— for cisterns, 42
Fingers, supernumerary, vaccination and removal of, 70
Fire-exterminator, Dick's chemical, 149
Firegrates, reform in, 224
Fireguards, 221
Flower, Major L., pollutions of water-courses, 396
——— sanitary engineering, 275
Food, demonstration on, 313
——— and drugs, new Act regarding sale of, 153
——— flesh, Dr. Cobbold on dangers of consumption of, 403, 449
——— hygiene of, Mr. E. Hart on, 244, 288, 333
——— ——— letter on, 318
——— for infants, 82, 121
——— inspection of, duty of public authorities respecting, 141
——— meat of diseased animals as, 284, 316, 317
——— purchase of articles of for analysis, 33
Foot-and-mouth disease, milk of cows with, 186
Foot-way, obstruction of, 272
Fowl-croup and typhoid fever, 99
Fowler's patent water-closets, 320
Fox, Dr. Cornelius, resignation of, 187
——— Mr. J. M., supply of water to rural districts, 123
Frost and sewage irrigation, 342
——— and water-supply, 274
Funeral car, Stretton's, 39
Fusel oil question, 20
Fylde rural district, Medical Officer's report on, 113

Galton, Captain D., sanitary engineering, 167
Gas baths, 150
——— heating, lighting, and ventilating apparatus, 419
——— impure, payment for, 234
——— outlet for products of combustion of, 158, 238, 277
——— production of from gasoline, 200
——— regulator, 149
——— stoves, 199
Gases, noxious, withdrawal of Bill on, 71
Gateshead, water-supply of, 157
Gillingham's radiating heat-generators, 199
Glasgow, air of, 261
Gloucester, Medical Officer's report, 147, 391
Gloucestershire, Medical Officer's report, 353
Goole, drainage of, 76, 157
——— sanitary matters at, 342, 402
Gout and lead-colic, relations between, 223
Grates and stoves, 199
Greens, village, legal decision on, 70, 115
Guernsey, Dr. Tripe on winter climate of, 215
Gully-trap, straining, 150

Hackney, Medical Officer's report on, 231
Halifax combination district, report of Medical Officer on, 30
Hammock, Ashantee pocket, 241
Hanley, Medical Officer's report on, 314
Hardwicke, Dr. J., meat as food for man, 284
Hart, Mr. Ernest, County boards, 443
——— hygiene of food, 244, 288, 333
——— a penny dinner, 221
——— The Truth about Vaccination, *rev.*, 395
Hartismere rural district, Medical Officer's report on, 391
Hastings, death-rate of, 104
——— Medical Officer's report on, 474
——— Dr. Tripe on winter climate of, 291
Haywood and Drysdale system of house-ventilation, 241
Haviland, Mr. A., evils of growth of suburban districts without regulation, 138
——— geology, 196
Health economy, Mr. F. Vacher on, 454
——— ministry of, 495, 440
Health-resorts, Dr. Tripe on winter climate of, 214, 245, 291
Heat-generators, 199
Heating of apartments by gas, 199
——— of schools, 59
——— and ventilation of churches, 82
Hebburn, Medical Officer's report on, 314
Helmsley rural district, Medical Officer's report on, 391
Henderson, Mr. C., results of experiments in warming and ventilating buildings, 196
Herefordshire, Medical Officer's report on, 73
Hertfordshire, Medical Officer's report on, 72
Hesperus star-lamp, 200
Highway, legal decisions concerning, 32, 115, 356, 394 479
Hill, Dr., diphtheria and typhoid in Birmingham, 433
Hime, Dr., vital statistics of Sheffield, 110
——— whooping cough and measles, 471
Hirsch, Dr. A., best mode of warding off epidemics, 144
Hitchin, typhoid fever at, 24
Holiday resorts, hint to, 460
Holsworthy rural district, Medical Officer's report on, 293
Hoole, Mr. Elijah, notes on industrial dwellings, 243, 283, 323, 367, 410
Hoskins, Mr. G. G., An Hour with a Sewer-rat, *rev.*, 115
Hospital accommodation for infectious disease, 437, 479
——— accommodation at St. Alban's, 187
——— drain and portable disinfectors, 401
——— fever, at Stockwell, additional pavilion, 41
——— for infectious diseases at Bournemouth, 41
——— ——— at Teignmouth, 41
——— Johns Hopkins, Dr. Van Bibbe on Future Influence of, *rev.*, 396
——— London Temperance, report of, 61
——— and sick-room, demonstration on, 352
——— small-pox, management of a, 470
——— for Women and Children, donation to, 56
Hospitals, Pay, and Paying Wards, Mr. Burdett on, *rev.*, 274
Hotel, Ilfracombe, 61
Hour with a Sewer-rat, Mr. G. G. Hoskins on, *rev.*, 115
House, action regarding sanitary condition of a, 476
Houses, drainage of, 472
——— improper construction of, 234
——— for labouring classes, 28
——— sanitary inspection of, 24
——— unfit for habitation, legal decision on, 272
——— unhealthy, 418
——— in villages, Dr. E. Buck on numbering of, 12
——— wholesome, 423
Housekeeper, metallic, 200
Howard medal, subject of, 5
Hunter, Staff-Surgeon J. M., Naval Dietaries, *rev.*, 34
Hygiene, Congress of at Turin, 482
——— of food, Mr. E. Hart on, 244, 288, 333
——— letter on, 318
——— Parkes Museum of. *See* Museum
——— and Public Health, Dr. A. H. Buck's Treatise on, *rev.*, 315
Hygienic Laboratory in University College, 341

Ilfracombe, climate of, 263
——— hotel at, 61
——— Dr. Tripe on winter climate of, 245
Iliffe, Mr. W., poisoning by milk, 340
Industrial dwellings. *See* Dwellings
Infant life, protection of, 21
——— mortality, 29, 261
——— ——— Dr. M. A. Fenton on, 327
Infantile diarrhœa, etiology of, 185
Infants, food for, 76
——— and invalids, Neave's food for, 121
——— suffocation of by bed-clothes, 185
Infirmaries, workhouse, alcohol in, 20
Inspection, sanitary, of jails, 426
Inspections by Local Government Board, 262
Institute, Sanitary, annual meeting, 27
Intemperance, mortality from, 140
Interments Act, 153
Ireland, new registrar-general for, 99
Islington, vital statistics of, 57

Jails, sanitary inspection of, 426
Jenkin, Mr. F., ventilation of sewers by soil-pipes, 322
Jenkins, Mr D., legal authorisation of sanitary proceedings, 237
Jerry building, 234
Jersey as a health resort, Dr. Tripe on, 215
Jeyes' perfect purifier, 122
Johnston, Dr. W., the causes of the prevalence of diarrhœa at Leicester, 43
Johnston's fluid beef, 442
Johnstone, Mrs., how to prevent the spread of fevers, 451
Jones, Dr. Leslie, ventilation of soil-pipes and house-drains, 296

Kent, West, Medical Officer's report on, 31
Kerr, Dr. N., enteric fever from contaminated water, 105
——— mortality from intemperance, 140
Keswick, Medical Officer's report of, 474
——— waterworks at, 76
Kettle, bronchitis, 151
——— croup, 152
King's Norton rural district, Medical Officer's reports on, 113, 474
Kingzett, Mr. C. T., the eucalyptus and the pine, 216
——— practical disinfection, 248
Kirkham, Medical Officer's report on, 112
Knife-cleaner, 149

Labouring classes, homes for, 28, 322
Lamp, Hesperus star, 200
Landlord's liabilities, 273
Latham, Mr. Baldwin, influence of sewage-farms on public health, 138
——— temperature of town water-supply, 109
Laundries, supervision of, 343
Lawton, Mr. H. A., desirability of state sanitary medical service, 371
Lead-colic and gout, relations between in sailors, 223
——— poisoning by water-pipes, 97
——— in soda-water, 185
Leakages in drains, detection of, 342, 398
Leamington, Medical Officer's report on, 147
Leeds, measles and scarlatina at, 322
——— vaccination in, 98
Legal authorisation of sanitary proceedings, 237
Legal cases, notes of:
——— Accidents, liability for, 115
——— Action, time for, 32
——— Adulteration of food, 33, 476
——— ——— of milk, 235
——— Analysis, cost of an, 233
——— Appeal, rating, 273
——— Arrears of rates, 74
——— Baby-farming, 234
——— Baking powder, 234
——— Bankruptcy of churchwardens, 356
——— Board, Local, power of, 115
——— ——— sewerage powers of, 356
——— Borough fund, 478
——— Borrowing powers, 478
——— Bridge, repair of, 394
——— Building by-laws, 393
——— ——— definition of, 356
——— ——— jerry, 234
——— ——— line, 33
——— ——— plans, 33
——— Carts and wagons, 479
——— Chicory and coffee, 394
——— Clerk of Board, libel on, 393
——— Clubs, 272
——— Commons, 74, 356, 476
——— Computation of time, 393
——— County Courts and nuisances, 476
——— Default of owners, 74
——— Distress warrant, 115
——— Drains, powers as to, 74
——— Driving, furious, 33
——— Dwelling house, sanitary condition of, 476
——— Excavation in highway, 33
——— Food, adulteration of, 33, 478
——— ——— unwholesome, 479
——— Footway, obstruction of, 273
——— Gas, impure, payment for, 234
——— ——— companies, powers of, 478
——— Guardians, election of, 393
——— Highway, certification of, 356
——— ——— enclosure, 115
——— ——— excavation in, 33
——— ——— lopping trees in, 115
——— ——— obstructed, 32
——— ——— stones on, 394
——— ——— surveyor of, 74
——— Hospital, 394
——— ——— infectious, 273
——— Houses unfit for habitation, 272
——— Infectious diseases, spread of 274
——— ——— spread by milk, 477
——— Infectious hospital, 273

Legal cases, *continued*:—
——— Jerry buildings, 234
——— Land, purchase of, 115
——— Landlord, liability of for overcrowding, 236
——— ——— and tenant, 272, 356
——— Landlords, liabilities of, 273
——— Land Clauses Act, 33
——— Libel on Clerk of Board, 353
——— ——— Medical Officer, 115
——— Libraries, 357, 354
——— Locomotives on roads, 272, 473
——— Magistrates and nuisances, 273
——— Malton Farmers' Manure Company, 32
——— Market, 33, 394
——— Meat, unsound, 273
——— Medical Officer, libel on, 115
——— Meetings, 33, 115
——— Metropolitan Local Management Act, 234
——— Milk, adulteration of, 235
——— Noxious trade, 394
——— ——— vapours, 394
——— Nuisances and county courts, 476
——— ——— and magistrates, 273
——— ——— from overcrowding, 356
——— ——— from sewer, 393
——— Obstruction of footway, 273
——— ——— of street, 479
——— Overcrowding, liability of landlord for, 236
——— ——— nuisances from, 356
——— Owners, default of, 74
——— ——— rating of, 272
——— Party wall, 74
——— Paving expenses, 356
——— Pollution of river Thames, 236
——— ——— of stream, 394
——— Pork-pies, Leicester, 274
——— Privies, separate, 115
——— Public Health (Water) Act, 235
——— Rates, 115
——— ——— arrears of, 74
——— ——— duty of justices as to, 32
——— ——— local, 272
——— ——— non-payment of, 32
——— Rating appeal, 273
——— ——— of institutions, 74
——— ——— of owners, 272
——— ——— of water-works, 74
——— Recreation grounds, 115
——— Right of way, 394
——— Scavenging, 357
——— Sea-shore, 74, 356
——— Sewer, nuisance from, 393
——— Sewers, access to, 273
——— Sewerage powers of Boards, 356
——— Stream, pollution of, 394
——— Street, obstruction of, 479
——— Surveyor of highways, 74
——— Thames, pollution of, 236
——— Tramways, 394, 476
——— Vapours, noxious, 394
——— Vestry meetings, 74
——— Village greens, 74, 115
——— Water company, powers of, 356
——— Water-supply and frost, 274
——— ——— of workhouses, 477
——— Water-works, rating of, 74
——— Workhouses, water-supply of, 477
Legislation, sanitary, in 1879, 217
Leicester, Dr. W. Johnston on diarrhœa at, 43
——— health of in 1878, Dr. Weir on, 90
——— Medical Officer's Report on, 232
——— public baths at, 76
Leighton, village of, 29
Lentilla, 482
Liverpool, water-supply of, 76, 193
Llandudno as a winter-resort, Dr. Tripe on, 246
Llanelly rural district, Medical Officer's report on, 147
Loans for gas and water-works, 95
Local Government Board, medical inspection of, 262
——— Medical Officer of, 262
——— new general orders of, 380, 401
——— report of 126
——— Ireland, parliamentary vote to, 71
Lodging-houses, accommodation in, Mr. F. Vacher on, 165
——— definition of, 33
——— hygiene in, 140
Lomas, Dr., Children's Lives and How to Protect them, *rev.*, 236
London, main drainage of, 30
——— open spaces in, 21
——— water-supply of, 29, 67, 96, 112
——— ——— in 1879, 351
London Colney, unsanitary state of, 157
Longstaff, Dr. G. B., etiology of summer diarrhœa, 350
Longton rural district, Medical Officer's report of, 392
Low, Dr. R. B., rural sanitation, 330
Lunacy, increase in, 97
Lunatics, neglected, 154
Lush, Dr., increase in lunacy, 97
Luton, death-rate of, 156
——— Medical Officer's report of, 475
Lutterworth rural district, Medical Officer's report of, 314
Lyddon, Mr. R., the health of Ramsgate, 410
Lymington, sanitary state of, 65

Macadam, Dr. Stevenson, arsenic in common things, 375
McCoy, Major, the Sanitary Institute, 34
Maidenhead Town Council, refusal of loan to, 76
Maidstone, Medical Officer's report of, 392
Malton urban sanitary authority, 220
Manchester, Bishop of, address to Social Science Association, 135
——— cottage-homes in, 213
——— sanitary works at, 387
Manure company, Malton, action against, 32
Market, legal decision concerning, 33
Market Drayton rural district, Medical Officer's report on, 132
Marsh, Dr. B. P., corporal punishment, 117
Marsh-fever, poison of, 262
Marshall, Mr. T. D., ventilation of the underground railway, 75
Masters, Mr. H., drainage of Blackpool, 397
Masters and servants, 127
Matlock invalid couch and bed-rest, 39
May, Mr. Joseph, jun., diarrhœa a zymotic disease, 75
——— ——— ventilation of drains, 396
Measles at Bolton, 263
——— at Nottingham, 459
Meat, diseased, case of at Heywood, 186
——— ——— consumption of, 297
——— ——— as food, 317
——— ——— and the Metropolitan Board of Works, 316
——— as food for man, Dr. J. Hardwicke on, 284
Mechi, Mr. J. J., reform in fire-grates, 224
Medal, Howard, for 1880, 5
——— of Sanitary Institute, 76
——— of Society of Arts, 322
Medical inspections of Local Government Board, 262
——— Officer of Local Government Board, 262
——— Officers of Health, association of. *See* Association.
——— ——— duties of, 380, 401
——— ——— districts of, Mr. J. Ll. Roberts on, 54
——— ——— reports of, *see* Reports
——— ——— returns to, 187
——— ——— society of, *see* Society
Merchant service, deaths in, 76
——— ——— scurvy in, 98
Merthyr Tydfil, Medical Officer's report, 232
Metallic house-keeper, 200
Meteorology reports, 99, 129
Metropolitan Board of Works and diseased meat, 316
——— ——— and dwellings for labouring classes, 322
——— ——— and offensive businesses, 97
Middlesex, Medical Officer's report of, 72
Milan, water-works in, 481
Milk, adulteration of 222, 224
——— ——— heavy fine for, 235
——— of cows with foot-and-mouth disease, 186
——— diseased, poisoning by, Mr. Iliffe on, 340
——— dissemination of infectious diseases by, fine for, 477
——— fat in, 185
——— spread of scarlet fever by, at High Ashurst, 40; at Fallowfield, 309
——— spread of typhoid fever by, 39, 142, 481
Ministry of Health, 425, 440
Mirrors, silvering of, 322
Moisture in soil, Dr. Notter on, 445
Moizard, M., lead-poisoning by water-pipes, 97
Montreal, vital statistics of, 96
Moore, Dr. J. W., management of convalescents from acute diseases, 107
Morrell's patent ash-closet, 149
Mortality, English rates of, changes in, 387
——— of infants, 29, 261; Dr. M. A. Fenton on, 327
——— of rich and poor, 142
Mortuaries, public, 114
——— want and construction of, 147
Moser's patent dry closets, 151
Mountain Ash, Medical Officer's report of, 393
Mourner's cloaks, 459
Müller's patent water-meter, 151
Museum, Parkes, of Hygiene, demonstrations at, 270, 313, 352, 472
——— ——— ——— donations to, 378, 431
——— ——— ——— opening of, 28
——— ——— ——— position of, 116

Naval Dietaries, Staff-Surgeon J. M. Hunter on, *rev.*, 34
Neave's food for infants and invalids, 121
Nelson, Mr. T. J., an incredible story, 396
Nelson's beef-tea and soups, 321
New South Wales, vital statistics of, 398
Newcastle Improved Industrial Dwellings Company, 157
Newcastle-on-Tyne, health of, 157
——— Medical Officer's Report, 232
Newhaven, scarlet fever at, 58
Nicol, Dr. James, registration of infectious diseases, 75
Nightcaps, 321
Nineteenth Century Building Society, 482
North, Mr. S. W., suggestions for an inquiry into causes of diarrhœa, 324
Northampton, Medical Officer's report of, 314
Norton's Abyssinian tube-well, 152
Notter, Dr. J. L., chemical and microscopic analysis of water, 87
——— sanitary notes, 363, 445
Nottingham, measles at, 459
Nuisances, effluvium, Dr. Ballard's report on, 414
Numbering of houses in villages, Dr. Elgar Buck on, 12
Nurses, trained, limitation of infectious diseases through, Rev. J. H. Timins on, 412

Offensive business and the Metropolitan Board of Works, 97
Ogle, Dr. W. and the registrar-general's office, 262
Open spaces in the metropolis, 21
Organic Analysis, Commercial, Mr. A. H. Allen's Introduction to, *rev.*, 155
Ormsby's system of collecting pure drinking water, 150
Overbeck de Meijer, Dr., defence against contagious epidemic diseases, 143

Page, Mr. H., vital statistics of Redditch, 319
Paints, poisonous, 379
——— sanitary, 69
Paper hangings, Woollam's non-arsenical, 277
Parkes museum of hygiene. *See* Museum
Patent medicines, absence of in Germany, 77
Patents, sanitary, 42, 82
Paupers, Sick, and their Medical Attendants, *rev.*, 396
Penistone, enteric fever at, 26
Penrith rural district, Medical Officer's report, 147
Penzance, Dr. Tripe on winter climate of, 254
Percolator, Buck's patent rain-water, 152
Peterborough, improvements at, 21
——— Medical Officer's report on, 475
Phthisis and subsoil drainage, 60
Pigs at Cheltenham, 344
Pine and eucalyptus, Mr. Kingzett on, 216
Plague, budget of the, 262
Plumbing, Mr. W. P. Buchan on, *rev.*, 275
——— bad, Mr. Eassie on dangers of, 182, 294
Plymouth (United States), charge of despoiling cemetery of, 76
Poisoning, arsenical, from wall-papers, 342
——— lead, by water-pipes, 97
——— by milk, Mr. Iliffe on, 340
——— by sausages, 229
Poisonous paints, 379
Poole, Medical Officer's report on, 475
Poor-law and sanitary business, 300
Poore, Dr. G. V., the Parkes museum of hygiene, 116
Poplar, Medical Officer's report on, 353
Population of the globe, 435
Pork-pies, Leicester, 274
Porter-Clark process for softening water, 398
Portsmouth, Medical Officer's report, 233
Powell, Mr. F. S., progress in sanitary science and practice, 139
Preston, population and death-rate of, 29
Preventive or state medicine, 108
Prudhoe, sewerage scheme for, 72
Public health Association. *See* Association
——— ——— conference on progress of, 466

Public Health, measure of, 141
——— ——— quarterly return of Registrar-General, 51
——— ——— weekly returns of Registrar-General, 25, 61, 100, 129, 188, 224, 264, 301, 344, 381, 427, 460
——— house, motto for a, 156
——— institutions, Mr. H. C. Burdett on unhealthiness of, 207
Punishment, corporal, 117
Purifier, Jeyes' patent, 122

Railway, underground, ventilation of, 22, 75
Rain-water percolator, Buck's patent, 158
Ramsgate, health of, 480
——— Dr. Tripe on winter-climate of, 292
Range, Treasure cooking, 200
Rat destroyer, a, 122
Rates, duty of justices as to, 32
Rawlinson, Mr. R., ventilation of soil-pipes and house drains, 362
Redditch, census of, 157, 319
——— death-rate of, 157
——— drainage of, 24
——— Medical Officer's report of, 475
Reformer stove, 200
Refuse, utilisation of, 387
Registrar-General, appointment of, 255, 315, 357
——— ——— for Ireland, 99
——— ——— quarterly return, 51
——— ——— weekly returns, 25, 61, 100, 129, 185, 224, 264, 301, 344, 381, 427, 460
Registrars' returns to sanitary authorities, 219, 260
Registration of infectious diseases. *See* Diseases
Reports of Medical Officers of Health:
——— Abergavenny, by Mr. Steele, 231
——— Aston Manor, by Mr. May, 391
——— Aston (rural), by Dr. Hickinbotham, 473
——— Bakewell (rural), by Dr. Fentem, 391
——— Bedford, by Dr. Prior, 391
——— Belper, by Mr. Allen, 113
——— Berkshire, by Dr. Woodforde, 270
——— Bethnal Green, by Dr. Bate, 352
——— Birkenhead, by Mr. Vacher, 353
——— Birmingham, by Dr. Hill, 112
——— Bisley, by Mr. Partridge, 473
——— Bolton, by Mr. Serjeant, 113
——— Bootle, by Mr. Sprakeling, 473
——— Brandon and Byshottles, by Mr. Blackett, 392
——— Brighton, by Dr. Taaffe, 313
——— Brynmawr, by Mr. Skrimshire, 147
——— Burnley, by Dr. Dean, 313.
——— Burton-on-Trent (rural), by Mr. Hooper, 231
——— Bury St. Edmunds, by Mr. F. W. Clarke, 392
——— Carlisle, by Dr. Elliot, 392
——— Carnarvonshire, by Mr. Rees, 271
——— Cheltenham, by Dr. Wright, 474
——— Cheshire, Mid, by Mr. J. W. Fox, 355
——— Consett, by Mr. Renton, 392
——— Croydon, by Dr. Philpot, 314
——— Derby, by Mr. Iliffe, 392
——— Devonport, by Mr. J. May, 474
——— Doncaster, etc., by Mr. Wood, 31
——— East Dereham, by Mr. Vincent, 474
——— Fylde, (rural), by Mr. Walker, 113
——— Gloucester, by Mr. Wilton, 147, 391
——— Gloucestershire, by Dr. Bond, 353
——— Hackney, by Dr. Tripe, 231
——— Halifax, by Dr. Britton, 30
——— Hanley, by Dr. Swift-Walker; 314
——— Hartismere (rural), by Dr. Barnes, 391
——— Hastings, by Mr. Ashenden, 474
——— Hebburn, by Dr. Spear, 314
——— Helmsley (rural), by Dr. Bruce Low, 391
——— Herefordshire, by Dr. Sandford, 73
——— Hertfordshire. *See* Middlesex
——— Holsworthy (rural), by Mr. L. Ash, 393
——— Kent, West, by Dr. Baylis, 31
——— Keswick, by Dr. Ward, 474
——— King's Norton (rural), by Mr. Hollinshead, 113, 474
——— Kirkham, by Mr. Walker, 112
——— Leamington, by Mr Baly, 147
——— Leicester, by Dr. Crane, 232
——— Llanelly (rural), by Mr. Thomas, 147
——— Longton (rural), by Mr. Walker, 392
——— Luton, by Mr. Sworder, 475
——— Lutterworth (rural), by Dr. Elgar Buck, 314
——— Maidstone, by Mr. Adams, 392
——— Market Drayton (rural), by Dr. Sandford, 232
Report: Merthyr Tydfil, by Mr. Dyke, 232
——— Middlesex and Hertfordshire, Dr. C. E. Saunders, 72
——— Mountain Ash, by Mr. Davies, 393
——— Newcastle-on-Tyne, by Mr. Armstrong, 232
——— Northampton, by Mr. Cogan, 314
——— Penrith (rural), by Dr. Robertson, 147
——— Peterborough, by Dr. Thomson, 475
——— Poole, by Mr. Lawton, 475
——— Poplar, by Mr. Corner and Mr. Talbot, 353
——— Portsmouth, by Mr. Turner, 233
——— Redditch, by Mr. Page, 475
——— St. Giles', by Mr. Lovett, 353
——— Saltley, by Mr. Cresswell, 475
——— Shrewsbury, by Dr. Thursfield, 314
——— Southampton, by Mr. Osborn, 315
——— Swansea, by Mr. Davies, 148
——— Tamworth (rural), by Dr. Fausset, 475
——— Taunton, by Dr. H. J. Alford, 233
——— Tendring (rural), by Dr. Cook, 233
——— Tottenham, by Dr. Watson, 113
——— Upton-on-Severn (rural), by Mr. J. S. Cowles, 315
——— Wakefield (rural), by Mr. Wood, 476
——— Wandsworth, 353
——— Wareham (rural), by Dr. Stainthorpe, 476
——— Watford, by Dr. Brett, 147
——— Weardale (rural), by Dr. Arnison, 476
——— Whitechapel, by Mr. Liddle, 113
——— Winchester, by Mr. Langdon, 315
——— Wirksworth, by Mr. Gaylor, 113
——— Worcester, by Dr. Strange, 476
——— Workington, by Dr. Ward, 393
——— Wrexham (rural), by Dr. Davies and Mr. Jones, 233
Re-vaccination in schools, 185
Richardson's pure thymol soap, 81
Roberts, Mr. J. Ll., districts of Medical Officers of health, 54
Roberts-Dudley, Mr. J., disinfection by acids, 317
Robinson, Mr. H., sewage disposal, 307
Rooms, ventilation of, 42, 201, 276, 318, 360
Runge, M., public baths, 147
Rural sanitation, Dr. R. B. Low on, 330
Ruthin, appointment of District Medical Officer, 29

Sailors, lead-colic and gout in, 223
St. Alban's, hospital accommodation at, 187
St. Giles's, Medical Officer's report on, 353
——— typhus in, 129
St. Leonard's, Dr. Tripe on winter climate of, 291
Salary, novel reason for reduction of, 426
Salt-works, nuisance caused by, 34
Saltley, Medical Officer's report of, 475
Sandown, Medical Officer s report of, 156
Sanitary Act, amendment of, 343
——— Appliances, Dictionary of, 35, 77, 117, 158, 238, 277, 294, 337, 418
——— appointment in Cyprus, 344
——— authorities, registrars' returns to, 219, 260
——— authorities and workhouse hospitals, 379
——— business and poor-law business, 300
——— condition of a dwelling-house, 476
——— ——— of schools, 95
——— conference of Society of Arts, 466
——— convention, Michigan, 473
——— defects and disease, 187
——— departments, urban, organisation and working of, Dr. J. M. Sutton on, 5
——— districts, combined, reports on, 17
——— ——— urban, health of, 62, 101, 131, 189, 225, 265, 304, 306, 345, 383, 429, 462
——— engineering, Mr. B. Denton on, 173, 195
——— ——— Captain D. Galton on, 167
——— fallacies, Dr. Corfield on, 204
——— influence of the crèche, Dr. A. McC. Weir on, 1
——— inspection of better-class houses, 25
——— ——— and classification of dwellings, 458
——— ——— of jails, 426
——— inspector, report of a, 476
——— Institute of Great Britain, annual meeting, 27; presentation of prizes and certificates, *ib.*
——— ——— Congress of, order of proceedings, 148; exhibits, 148, 184, 199; Dr. de Chaumont on certain points with reference to drinking water, 163; Mr. Vacher on common lodging-house accommodation, 165; Captain D. Galton on sanitary engineering, 167; Mr. B. Denton on certain points in the work of an Engineer, 173, 175; Mr. E. Chadwick on norma of sanitation in the school stages of life, 176; Dr. H. Swete on the interpretation of water-analysis for sanitary purposes, 178; Mr. Eassie on dangers of bad plumbing, 182, 194; mortality from alcohol, 193; improvement of sewage-irrigation, 195; the double conduit system, *ib.*; registration of house-drains, *ib.*; warming and ventilation, 196; geology, *ib.*; rain-water for domestic water-supply, *ib.*; influence of weather on disease, 197; quarters for British soldiers, *ib.*; ventilation of buildings, *ib.*; disinfection of excreta, *ib.*; softening and purification of water, *ib.*; health at home, 198; health and good food, *ib.*; Dr. A. Carpenter on first principles of sanitary work, 203; Dr. Corfield on sanitary fallacies, 204; Mr. Burdett on unhealthiness of public institutions, 207
Sanitary Institute, awards of, 230; prize of, 76, 282
——— inventions, 39, 81, 121, 162, 241, 281, 320, 398, 440
——— jottings, 41, 76, 156, 322, 398, 481
——— legislation of 1879, 217
——— legislation, local, 376
——— medical service, state, Mr. H. A. Lawton on desirability of a, 371
——— notes, Dr. J. L. Notter's, 363, 445
——— paints, 69
——— patents, 42, 82
——— proceedings, legal authorisation of, 237
——— protection association, Edinburgh, 434
——— registers, 128
——— review of 1879, 256
——— science and practice, progress of, 139
——— surveyors, 459
——— work, Dr. A. Carpenter on principles of, 203
——— works at Manchester, 387
Sanitas, Mr. Kingzett on, 248
——— manufacture of, 66
Sanitation, rural, Dr. R. B. Low on, 330
——— in school stages of life, Mr. E. Chadwick on, 176
Sausages, poisoning by, 220
Scarlet fever and milk, 40, 308
——— mortality from, 53
——— in Derby, 76
——— at Ludlington, 157
——— at Newhaven, 58
——— in Sussex, 185, 220
Schools, heating of, 59
——— re-vaccination in, 185
——— sanitary condition of, 95
——— and scarlatina, 185
——— at Winchester, 59
School stages of life, Mr. E. Chadwick on sanitation in, 176
Scilly Islands, Dr. Tripe on winter-climate of, 214, 215
Scott, Major-General, improvement of sewage-irrigation, 195
Scurvy in the merchant service, 98
Sea-air for sick children, 58
Seamen, deaths of in merchant service, 76
Seaton, Dr. E., arsenical poisoning from wall-papers, 342
——— ——— hot-air chamber for disinfecting clothes, 479
——— Dr. E. C., resignation of, 262
Seelheim, Dr., the duty of public authorities in regard to inspection of food, 141
Sewage contamination, previous, 23
——— disposal of, 307
——— farm, Barnsley, 59
——— farms, cultivation of, 379
——— ——— influence of on public health, 138
——— ——— prizes to, 301
——— irrigation, improvement of, 195
——— matter, poisoning by, 53
——— pollution, action for, 56
——— steamer at Liverpool, 342
——— treatment of, Dr. Angus Smith on, 369
——— water used for brewing, 157
Sewer-Rat, Mr. Hoskins on an Hour with a, *rev.*, 115
Sewerage, pneumatic system of, 67, 150
——— at Halstead, 223
——— of Lower Thames Valley, 25, 114, 421, 436
——— for Prudhoe, 72
——— at Solihull, 111
——— at Wigton, 343
——— at Yardley, 167
Sewer-gas, erysipelas from, 221
——— traps for, 149, 150
Sewers, rock concrete tubes for, 162
——— ventilation of, 60, 242, 276, 358, 361, 379

Sheep-rot at Bristol, 220
Sheffield, vital statistics of, 110
Shere, the churchyard at, 61
Shone, Mr., pneumatic system of sewerage, 67
Short-sightedness, prevalence of, 76
Shrewsbury, Medical Officer's report on, 314
Slough, regulations for drainage of, 442
Small-pox at Bath, 343
——— at Birkenhead in 1877, Mr. Vacher on, 372
——— in India, 425
Smith, Mr. George, grant to, 349
——— Dr. Parsons, registration of house-drains, 195
——— Dr. R. Angus, treatment of sewage, 369
Smoke, coal, Mr. C. Estcourt on pollution of air with, 83
Soap, creasote, 122
——— Richardson's pure thymol, 81
Society, Cremation, Transactions of, *rev.*, 358
Society, Epidemiological, vaccination of supernumerary fingers, 70
——— of Medical Officers of health, meetings of, 192, 229, 269, 310, 350, 390, 433, 469
——— National Health, annual meeting, 313
——— New Jersey State Agricultural, sanitary exhibition of, 482
Soda-water, lead in, 185
Soil-pipes, 42
——— ventilation of, 281, 296, 480
Soldiers, scientific quarters for, 197
Solihull, sewerage works at, 111
Soper, Dr., disinfection of excreta, 197
Soper's disinfectors, 401
Soups, Nelson's, 321
Southampton, Medical Officer's report on, 315
Spinal couches, 151
Sporokton, 81, 242
Stainthorpe, Dr., ventilation of rooms, 318
Stansfeld, Right Hon. J., address to Conference on Public Health, 466
Steam-spray apparatus, 151
Steamer for sewage at Liverpool, 342
Stevens's ventilators, etc., 151
Storm-overflows, 340
Story, an Incredible, Mr. Nelson on, *rev.*, 396
Stott, self-acting gas regulator, 149
Stoves, Abbotsford, 199
——— hygienic ventilating, 148, 159
——— reformer, 200
——— save-all waste register, 199
——— slow combustion treasure, 199
——— thermhydric, 199
Street accidents, 71
Stretton's folding bier and funeral car, 39
Strutt's absorbent wool, 81
Suffocation by bed-clothes, 185
Sundays out, 343, 398
Surveyors, sanitary, 459
Sutton, Dr. J. M., organisation and working of urban sanitary departments, 5
Swansea, enteric fever at, 99
——— Medical Officer's report on, 148
Swete, Dr. H., the interpretation of water-analysis for sanitary purposes, 178
Swimming for women, 156
Syphons, self-acting intermittent, Mr. R. Field on, 212, 361; Dr. F. T. Bond on, 287
Syrup for digestible purposes in food, 42
Syson, Mr. E. J., are diseased animals fit for food, 317

Tamworth, water-supply of, 156
——— rural district, Medical Officer's report of, 475
Taunton, Medical Officer's report on, 233
Tea, analysis of, 357
Teignmouth, hospital for infectious diseases at, 41
Telegrams, weather, 379
Telephones, 149
Temperature of town water-supply, 109
Tendring rural district, Medical Officer's report on, 233
Thames, pollution of the, 236
Thames Valley, Lower, drainage scheme, 25, 114, 421, 436
Thermhydric stove, 199
Thwaite, Mr. B. H., soil-pipe ventilation, 480
Thymol soap, Richardson's pure, 81
Timins, Rev. J. H., limitation of infectious diseases through agency of trained nurses, 412
Tobacco, abuse of, 223
Torquay, Dr. Tripe on winter climate of, 247
Tottenham, death-rate of, 76
——— Medical officer's report on, 113
Tottenham, water-supply for, 73
Trapping drains, 42
Traps for sewer-air, 149, 150
Treasure cooking ranges, 200
——— stoves, 199
Trichinosis on board the *Cornwall*, 388
——— Dr. T. S. Cobbold on, 403, 449
Tripe, Dr. J. W., diarrhœa from eating dripping, 64
——— disinfectants and deodorants, 269
——— hot wells of Bath and their uses, 48
——— winter-climate of health-resorts, 214, 245, 291
Trumpet-mouthed open ventilators, 116
Tulloch's pure Dutch cocoa, 321
Turkish bath, cabinet, 149
——— ——— portable, 151

Undercliff, Dr. Tripe on winter climate of, 293
Upton-on-Severn, Medical Officer's report on, 315
Urban sanitary departments, Dr. J. Mc. Sutton on organisation and working of, 5
——— sanitary districts, health of. *See* Sanitary Districts

Vaccination, animal, bill for, 58
——— in Leeds, 98
——— prosecutions, 71
——— and small-pox in India, 425
——— statistics of, at Durham, 357
——— of supernumerary fingers, 70
——— the Truth about, Mr. E. Hart on, *rev.*, 395
Vacher, Mr. F., common lodging-house accommodation, 165
——— health economy, 454
——— the Metropolitan Board of Works and diseased meat, 316
——— small-pox at Birkenhead in 1877, 372
Vapours, noxious, 394
Van Houten, M., protection of children against premature work, 144
Van Trenhoven, M., choice of potable waters, 143
Vegetation, Dr. Notter on sanitary relations of presence or absence of, 447
Ventilating apparatus, 82, 151, 200
——— croup-kettle, 152
——— stoves, 148, 199
——— and trapping houses and drains, 42
Ventilation of buildings. *See* Warming
——— of canal-boat cabins, 22
——— of drains, sewers, and soil-pipes, 34, 42, 60, 74, 242, 276, 296, 358, 361, 362, 396, 397, 438, 439, 480
——— Hayward and Drysdale's system of, 241
——— of rooms, 201, 276, 318, 360
——— and sanitation, 202
——— of underground railway, 22, 75
——— by vertical tubes, 379
Ventilators, automatic, 42
——— Boyle's double-action soil-pipe 281, 318
——— conical, 149
——— double-tube, 117
——— drawer inlet, 151
——— empress, 150
——— influx and efflux, 151
——— for rooms, 42
——— rotary, 77
——— self-acting exhaust, 151
——— for shafts, 35
——— trumpet-mouthed, 116
Ventnor, Dr. Tripe on winter climate of, 293
Village greens, 74
Villages, Dr. E. Buck on numbering of houses in, 12
Vital statistics of Islington, 57
——— ——— of Montreal, 96

Wakefield, death-rate of, 156
——— rural district, Medical Officer's report on, 476
Wall-papers, arsenical poisoning by, 342
——— without arsenic, 152
Walsall, death rate of, 157
Wandsworth, Medical Officer's report on, 353
Wareham rural district, Medical Officer's report on, 476
Warrington, treatment of town-refuse at, 157
Warming and ventilating buildings, 196, 197
Washing machine, 150
Water, analysis of, chemical and microscopical, Dr. Notter on, 87
——— ——— Dr. Swete on interpretation of for sanitary purposes, 178
Water, from artesian and other wells, 42
——— charge for, at Devizes, 76
——— colorimetric examination of, 142
——— contamination of by zinc, Dr. A. Downes on, 333
——— drinking, choice of, 142
——— ——— Dr. de Chaumont on certain points with reference to, 163
——— ——— Ormsby's system of collecting, 150
——— impure, alleged poisoning by, 129
——— metropolitan, composition and quality of, 29, 67
——— polluted, influence of on health, 98, 301
——— Porter-Clark process for softening and purifying, 197, 398
——— previous sewage contamination of, 23
——— specific heat of, 216
——— spread of diphtheria by, 13, 344
——— ——— of infectious diseases by, 104, 105
Water-closets, excelsior valveless, 152
——— Fowler's patent, 320
——— supply of water to, 42
——— and traps, 352
Water-courses, pollution of, 275, 298, 396, 439
Water-filters, 149
Water-meter, Müller's patent, 151
Water-supply, difficulty in, Dr. Britton on, 25
——— domestic, 140
——— and frost, 274
——— of growing towns, 380
——— national, 140, 357
——— rural, 342, 361
——— of rural districts, Mr. J. M. Fox on, 123
——— summons under Act concerning, 235, 274
——— temperature of, 109
——— urban, 220
——— of workhouses, 477
——— of Chester, 59
——— of Gateshead, 157
——— of Liverpool, 76, 193
——— of London, 96, 112
——— ——— in 1879, 351
——— of Sittingbourne and Milton, 153
——— of Tamworth, 156
——— of Tottenham, 73
Water-pipes, lead-poisoning by, 97
Water-works, appliances for, 149
——— at Droitwich, 22
——— at Keswick, 76
Watering places, English and Welsh, mortality in, 16, 24
Watford, Medical Officer's report on, 147
Weardale rural district, Medical Officer's report of, 476
Weather telegrams, 379
Weir, Dr. A. McC., sanitary and moral influence of the crèche, 1, 61
Well, Norton's Abyssinian tube, 152
Well-tubes, 150
Wells, poor-law and sanitary business at, 300
Welton, Mr. T. A., changes in English rate of mortality, 387
Weymouth, drainage of, 357
Whitechapel, Medical Officer's report on, 113
Whitwell's register stove grate, 199
Whooping-cough and measles, 471
Wigton, sewerage and drainage of, 343
Winchester, Medical Officer's report on, 315
——— schools at, 59
Window, patent imperial, 281
Winter climate of health-resorts, Dr. J. W. Tripe on, 214, 245, 291
Wirksworth, Medical Officer's report on, 113
Women, swimming for, 156
Wool, Strutt's absorbent, 81
Woollam's non-arsenical paper-hangings, 27
Worcester, Medical Officer's report of, 476
Workhouse hospitals and sanitary authorities, 379
——— infirmaries, alcohol in, 20
Workington, Medical Officer's report on, 393
Wrexham rural district, Medical Officer's report on, 233

Yardley, sewerage works for 165

Zeeman, Dr., measurement of state of public health, 141
Zinc, contamination of water by, Dr. A. Downes on, 333
Zoedone, 150

ORIGINAL PAPERS.

THE SANITARY AND MORAL INFLUENCE OF THE CRÈCHE.

By Alexander McCook Weir, M.D., Leicester.

Latterly, the question of infantile mortality has been prominently before the readers of the Sanitary Record and the public generally, but more from a causative than a preventive point of view. The concensus of opinion, both in England and on the Continent, is clearly in favour of its social causation, in which is included the birth-rate, and the habits and employment of the people in any given town or district. The present, therefore, seems to be a fitting occasion to give a short sketch of the *crèche* system of bringing up children, as it exists on the Continent, but particularly in Belgium, France, and Italy. I may state my conviction at the outset, that nothing but personal experience will succeed in clearing the British mind of its prejudice against this and many other equally important Continental institutions. The national mind seems to be profoundly imbued with the notion that any interference with so-called domesticity is an infringement on the political and social rights of the Englishman, whatever may be his grade. There is, doubtless, as much truth in the sentiment that, 'An Englishman's house is his castle', as in the fact that it is sometimes used for the most Herodian of purposes. That these 'castles' are so used, to a very great extent, is clear from the returns of infantile mortality in most of the large towns. This being so, the question arises, has the time come for a general introduction of public nurseries throughout the country? For a *crèche* is neither more nor less than a public nursery, to which is sometimes added, as in Belgium, a guardian school. The *Crèche Ecole Gardienne* combines, as its name implies, the nursery and the school, and is a recognised institution in Belgium. As it appeared to me, on a recent visit to the Belgian Capital, it is the embodiment of active benevolence and high civilization, and, from my point of view, indicates, more than anything else, the disposition and intentions of that well governed and industrious people. There are several of these institutions in Brussels, four of the largest and best managed of which I visited, and, by the courtesy of the officials, inspected in detail. That of *Saint Josse-ten-Noode*, which is situated in the *faubourg* or suburb bearing the same name, is the largest, having nursing and educational accommodation for close on 200 children. It was founded in the year 1846, and the first article of its internal organisation, translated from the French, reads as follows:—'The *Crèche* Guardian School, founded at *St. Josse-ten-Noode*, the 16th December 1846, is an establishment in which the children of the working classes are cared for and educated, from their birth till the day when they are able to frequent the primary schools.' It is on the most liberal basis. The institution is open without distinction to children of both sexes, and all are treated on a footing of perfect equality. Its government consists of a Council of Administration, and a Committee of Lady Patronesses. Apart from 'school payments', the institution is maintained by donations, ordinary subscriptions, and subsidies by the public authorities. These 'school payments' are really nominal, when measured against the advantages conferred, and the working expenses of the establishment. Article first—of its internal management—decrees that every child, whose parents live in the Commune of St. Josse-ten-Noode, or one of the neighbouring Communes, can be admitted to the *crèche* at the age of about nine days, and to the guardian school, from two years up to the age of entering the primary schools, that is, to eight years of age. It is further decreed that the child 'should be vaccinated' before school age. The children are classed, with regard to payment, in the following categories: (1) Orphans without resources, and children of the very poor, and of widows and widowers, without assured means of subsistence. (2) the children of labourers, whose work is not regularly assured. (3) Workmen's children, whose employment is regularly guaranteed. The children of the first category are received without payment, the second pay thirty-six centimes (barely threepence-halfpenny) for the *crèche*, and six centimes (about three-farthings) weekly for the school. The third class pay seventy-two and twelve centimes (about eightpence-halfpenny altogether) for *crèche* and school respectively. Both at *crèche* and school the children are received, attended to, and educated, during the whole working day; but they cannot enter the school after 9 A.M., or be removed before 4 o'clock in winter, and 5 in summer, unless under extraordinary circumstances. The *crèche* does not receive, and no infant can be admitted, definitely, before being visited by one of the medical staff of the institution. Mothers are at liberty to come to suckle their children when they like. Otherwise, the children are fed according to the prescriptions of the medical staff. The food consists of, first, for infants at the breast, milk-and-water panada, and sweetened barley water, for winter beverage; sweetened milk and water for summer drink. The food must be prepared daily, and given warm. For children above seven months, and who are not yet weaned, the panada is replaced once a day by skimmed broth; and children of the third class, who have been already weaned, receive concentrated panada, and, once a day, unskimmed soup, with the addition of vegetables, such as peas, carrots, potatoes, onions, etc. The school children carry their bread in a little satchel, which has a number affixed for identification, and are supplied at mid-day with a large plateful of strong soup, for which they are charged the net cost of the ingredients. In addition to the foregoing regulations, which I have condensed to the best of my ability in the translation, the questions of space, ventilation, temperature, cleanliness, and directions with regard to the method of dealing with the infants, are prescribed with rigid detail. For example, under the heading *prescriptions diverses* are found the following:—Cradle, little; walk, much; make the children who can, walk; rarely scold; never beat; act with the greatest kindness; sleep the infant now on one side, again on the other, with the head always slightly elevated; cover sufficiently, but not too much; do not leave the child too long seated in a chair, or otherwise; and do not hinder its movements with long clothes; do not lift it out by an arm; keep the feet warm, the belly free, and the head cool; do not leave painted toys in the *crèche*, or anything that could injure the child; never interrupt its sleep, or excite it to discontent or tears. Directions such as these require no comment.

In the school the children are arranged in three classes, ranging from the third or youngest, to the first or oldest; and the education, which is strictly according to Frœbel's system, is so conducted as to guarantee to the children 'the special care which

suits their age, and to prepare them for the higher schools, by giving them an elementary knowledge of reading, writing, and arithmetic; as well as to fit them for ordinary life, by instilling habits of morality and maternal discipline.' To those acquainted with the educational system practised in the *Crèche* Guardian Schools of Brussels, Frœbel's sublime idea of *Jardins d'Enfance* has had a veritable fulfilment. Gymnastic exercises play an important part in this system, and there could be nothing more beautiful, or in greater contrast to the disorderly and, for the most part, awkward movements of the offspring of the corresponding classes in this country, than the disciplined and healthy exercises of the children in attendance at these schools. Accompanying those exercises are descriptive and suitable songs, which develop their musical powers, and give harmony to the movements at the same time.

Corporeal punishment is strictly prohibited: it is even forbidden to put a child on its knees, or to do anything that could expose it to the ridicule of its little schoolmates. On the principle that punishment should 'assist education, and aid in the formation of character', the mistress is directed to inform the *directrice*, who, if found necessary, removes the child from the class, and administers healthy advice. That failing, the child is referred to the lady president of the educational section, who deals more severely; but not even temporary exclusion can be pronounced without the approval of the Committee. Both *crèche* and school are visited daily in all their details, by one or other of the lady patronesses, a visiting list of the latter being drawn up by a joint Committee of the Council of Administration and Committee of Lady Patronesses. The joint Committee have the control and management of the internal affairs of the institution, including housekeeping, nursing, education, etc. The president and lady president of the respective governing bodies inspect the establishment monthly, at least, accompanied by one or other of the acting lady visitors, or presidents of the various sections. The department of finances is alone under the control of the Council of Administration. Questions of general interest to the institution are determined by an absolute majority of the united Council, the president having the casting vote: but no decision can be taken with less than seven members present. If the attendance be less than seven, the sitting is postponed for a week, and then the questions under discussion are decided, irrespective of the number present.

Members of Council who do not attend the general sittings are fined fifty centimes, which is applied to the benefit of the institution. For the registration and execution of the decisions of the Council, there are secretaries and a treasurer; the *personnel* of the establishment consisting of a *directrice*, and a staff of nurses and schoolmistresses. An excellent arrangement of the institution is the annual distribution of prizes to both mothers and children. Useful household articles and clothing are given to encourage the mothers in habits of thrift, order, cleanliness, and punctuality, so that they may better appreciate the education accorded to their children. The latter receive books, clothing, and other useful and interesting objects. Such, in brief, is the organisation and working of this model *Crèche* Guardian School, but it is not to be understood that the others are a whit behind it in anything excepting size.

It should be mentioned here that the next largest *Crèche* Guardian School of Brussels had an average daily attendance of 140 to 150 infants in 1878—*i.e.*, 100 at the guardian school and forty to fifty in the nursery; and an income for the same year of 22,276 and an expenditure of 12,441 francs. This gave a balance of nearly 10,000 francs on the year's proceedings. With the exception of 3,408 francs derived from the children, the whole of the money was received from benevolent sources—*e.g.*, donations, subscriptions, the product of *fêtes*, concerts, theatricals, etc., etc. The daily average expenditure for each infant was thirty-four centimes (say threepence-halfpenny), and the average number of hours spent daily at the *crèche* was eleven. This statement, so flattering to Belgian administration and so worthy of British imitation, was embodied in Dr. Huyvenaer's annual report presented to the general assembly of the Infant Life Protection Society of Brussels, in its sitting of 8th December 1878.

It is under the auspices of this society that the majority of the *crèche* guardian schools are established, and among its decrees occurs the following momentous article:—'The society having no banner but benevolence, appeals to all creeds. All political or religious discussion is prohibited.' To the faithful observance of this statute the society, no doubt, rightly attributes its remarkable success.

During a short stay in Paris, on my return journey I was able, through the courtesy of the officials, to compare the *crèche* system of the French capital with that of Belgium; and, as far as my experience goes, it is decidedly inferior, both as regards internal administration and results. For the most part, the Parisian *crèches* are on a Roman Catholic basis, and, no matter how liberal is one's Protestantism, it is impossible to deny the superior efficacy of a system which, like that of Brussels, is founded on a purely philanthropic basis. I travelled a long way to inspect the largest *crèche* in Paris, and found it under the control of a sisterhood who were in costume, from the kitchenmaid to the *directrice*. Nothing of the kind is to be seen in Brussels, and no matter how true the maxim, *Ce n'est pas le costume, c'est le caractère qui fait la meilleure surveillante*, one could not help noticing the contrast. Although the utmost good order prevailed, there was not that scrupulous cleanliness and complete absence of odour in the lavatories which are characteristic of the Belgian institutions. I must say, however, that in two other *crèches* of smaller dimensions which I visited, the same objections were not observable. Advantages of site also militate in favour of the Brussels *crèches*, and from reports I gather that to obtain these is the difficulty *par excellence* of the French Society of *Crèches*. It is hardly necessary to point out that advantages of site are momentous from a sanitary point of view, and to this, doubtless, as much as to administration, may be attributed the greater degree of success that has attended the Belgian institutions. Nursing is the chief function of the French *crèche* as it exists in Paris, and, indeed, it may be asserted that Frœbel's system is scarcely known. In the communal schools to which the children are transferred direct from the majority of the *crèches*, that system is partly taught, but to nothing like the same extent as in the corresponding schools of Brussels. Considerable illness is not unfrequently experienced in the Parisian *crèches*, but insurmountable defects of site seem to be chiefly accountable for this. All of the *crèches* I visited, both in Brussels and Paris, have one or two cradles set apart and placed in a room adjoining, but quite away from the nursery, to receive a sudden case of illness. This precaution is creditable to the medical staff, who are evidently alive to the importance of

prompt isolation, and, although seldom or never required, is an indispensable adjunct to a well-ordered *crèche*. I was rather surprised to hear that diarrhœa is a disease almost unknown to the *crèche*, and repeated inquiries failed to elicit any evidence of its seasonal occurrence. Whenever disease does exist, it is nearly always imported from the child's home.

On the general question of the utility of *crèches*, there has been a good deal of discussion lately on the Continent. From the *Bulletin de la Société des Crèches* of October 1878, and January 1879, I learn that the French Minister of the Interior, at the request of the committees of several Parisian *crèches*, permitted the institution to occupy a place at the Universal Exhibition of 1878, and the afore-named society, which was founded in 1846, exhibited a model *crèche*, and was awarded, by the jury of inspection, a gold medal. So much were the Japanese delegates delighted with the model, that they visited several of the Parisian *crèches*, and had a special model of a *crèche* constructed to carry home with them. According to the returns furnished to the Minister of the Interior, the number of *crèches* in France in 1876 was 139, of which 36 were in the Department of the Seine and 103 in the rest of the country. The total daily attendances at the former in 1876 was 247,000, and in 70 of the latter which furnished returns, 622,000. The number of *crèches* in the Department of the Seine is now 41.

The question of *crèches* came before the International Congress of Hygiene in its sitting at Paris in August last, on a discussion with reference to the prevention of infantile mortality, and its utility was fully recognised. Originally established at Paris with a view to counteract the vicious practices of professional nursing, they have had a very beneficial influence in this respect, and, notwithstanding disadvantages alluded to, may be considered a great success. Their effect, however, on infantile mortality is almost *nil* when compared with Brussels, and their educational influence at an immense discount. The Free Congress of Education, which sat in Paris in September last, expressed an opinion that it is necessary to establish a state of society in which women will devote their whole time to the nursing and care of their children, and that they should receive pecuniary assistance for that purpose. Strange to say, I made a similar recommendation not long ago (SANITARY RECORD, 28th March 1879), and submitted it to Mr. Taylor, the senior member for Leicester. The hon. gentleman pronounced it 'impolitic', and, although he failed to state his reasons, there can be no doubt that a system of maternal subvention which savours of 'out-door' relief might encourage indolence and vagrancy. Apart, therefore, from interfering with the liberty of the subject, the *crèche* is the only remedy for the *status quo*. The arguments of the Society of Crèches were mainly directed against the moral aspect of the recommendations of the Congress; but, while pointing out the inexpediency of admitting into the *crèche* illegitimates on equal footing with legitimates, it stated that it was rare in practice for any child to be refused admission. The main objection of the Congress was based on the insanitary condition of some of the *crèches*, the causation of which has been already alluded to.

The foregoing account of this admirable Continental institution would be incomplete without a reference to the *crèche* movement in Italy, Spain, Portugal, and Bohemia. The success which has attended their establishment at Milan has been exceedingly remarkable. From their establishment in France, in 1845, their moral and social utility has been a fruitful subject of discussion to Italian medical and sanitary associations. At their primary establishment in France in 1845, about twenty years after, on the suppression of *tours* for foundling infants, and again more recently, in 1868, these discussions assumed a prominent position. On the last-named occasion, the subject was brought before the Italian Medical Association by M. Romoli Griffini, Director of the Foundling Hospital at Milan, and was discussed in connection with the question of infantile mortality. Italian public attention has been called still more thoroughly to the subject of infantile mortality and the prophylactic virtues of the *crèche* by Dr. Cesare Musatti, of Venice, and the success which has attended his efforts will subsequently appear. There has also been a vigorous discussion carried on by the lay papers of Milan, and the influence of the *crèche*, from a maternal, infantile, and social point of view, has been exhaustively dealt with. Comparing it with other means of succouring very young children, the system of 'out-door relief' (to use an English phrase) proposed by the Free Congress of Education has been rejected, and the *crèche* system advanced as the only effectual remedy known at present. The *crèche* movement at Milan was primarily undertaken by Madame Laura Mantegezza Solera, a woman of great ability, who was authorised, by an official decree of 25th May 1850, to establish a trial *crèche* for one year in the poorest quarter of the city. The *crèche* was opened on the 15th June 1850, and, in a month, received forty children, of whom eighteen were unweaned. In a report issued on the 9th December following, sixty-eight infants are reported as having been relieved, representing as many families, of which neither father nor mother could remain at home to take care of their offspring. A lucid and eloquent description of the state of some of the infants when received is given. In the month of November alone, four infants were brought to the *crèche* horribly burned in the absence of their parents, and all four died in great agony. Prior to the opening of the *crèche* at Milan, foundling hospitals, from being ostensibly asylums for infants whose parents were unfortunately circumstanced, had degenerated into mere haunts of illegitimacy. One poor woman who had consigned seven of her legitimate children to one of these dens, brought the eighth to the *crèche*, where she could come as often as she liked to nurse her infant, and it was her custom to bless God for His gift of that sacred institution. Another poor woman, companion to the former, brought her ninth child to the *crèche*, the other eight having been nursed by proxy at the foundling hospital, and was equally delighted. These will suffice, out of many examples given. Of sixty-eight admissions to the *crèche* up to the date of reporting, no less than fifteen were withdrawn from the foundling hospital and transferred to the former institution. Morally, therefore, the *crèche* proved a great success at Milan; the experiment was sanctioned, and another *crèche* was opened by the founder in 1851, and two others in 1868-9. On her death, in 1873, another was opened to her memory, and on the 26th April 1866, an official decree constituted the *crèche* a civil institution. The opening of the *crèches* in 1868-9 coincided with the closing of the Milan Foundling Hospital, and the Director of the last-named institution testified before the Italian Medical Association in 1868, that the *crèche* is the most efficacious means of preventing the abandonment of and diminishing the mortality among infants of tender age. Thus the *crèche*, as a purely benevolent

enterprise, outrivalled the state-supported institution at Milan, and the same thing applies to Genoa and other Italian towns. At first only legitimate infants were received on payment of a penny a day, but these regulations were suspended in 1872, the period of residence in the *crèches* ranging from fifteen days to two years and a half. It has also been a regulation at the Milan *crèches* for mothers to come twice a day to nurse their children, and each institution is in the care of an *inspectrice*, assisted by lady visitors, and a medical man, whose duty it is to inspect the infants before admission and look after the general health of the establishment. Great pains have been bestowed on the education of the mothers in domestic management and in the care and treatment of their infants, which are, in my opinion, of the utmost moment, if not in reality the highest functions of the *crèche*. Since their formation in June 1850 to the 30th December 1877, the Milan *crèches* received 8,472 infants, of which number 5,334 were weaned and 3,138 unweaned. The mortality among the latter in 1877 was 18 per cent., and 17 per cent. among the former, this proportion being similar to previous returns and much below the average of Lombardy, where one-third of the infants die during their first year, and nominal compared with the mortality among foundlings, which was 39.5 per cent. in 1874. It is somewhat remarkable that the last-named per centage is but .3 above the mortality under a year in Leicester in 1878, where the children that are not left to wander about the streets in charge of brothers and sisters not able to take care of themselves, are put out to professional nurses. Although poverty was originally, and is still, to a large extent, a qualification for admission to a Milan *crèche*, it is evident, from a comparison of the lists giving the employment of the parents, that they correspond to the English working classes, whose wages and social position are far superior to their Italian brethren and sisters. I regret the length of this notice, but it may be consolatory to know that it is much longer in the French from which it is taken.

At Venice, the recent introduction of *crèches* has been heralded with great *éclat*. Originally due to the prolonged exertions of Dr. Musatti on the question of infantile mortality, the first installation took place in January last under royal patronage, and with the authority of a royal decree which constituted it a civil institution. £5,000 in subscriptions was realized on that occasion.

At Lisbon *crèches* have existed under the auspices of an association since 1875. Encountering considerable opposition through prejudice at first, they are now very popular, are under royal patronage, and receive children for a penny a day. Admission was free at first, but it was thought conducive to public morality to require a small payment, which would give the working classes an interest in the movement. 'By means of the *crèche*,' says the Portuguese Association, 'ignorance, which is certainly one of the principal causes of infantile mortality, can be altogether overcome.'* 'The *crèche*,' it goes on to say, 'is not only a guardian for the infants whose mothers are obliged to work out-of-doors, but a maternity school, where workmen's wives, and even lady patronesses themselves, learn to bring up children.' In addition to royal gifts and patronage, there are public subscriptions, *fêtes*, and theatricals, at which verses to the honour and success of the *crèche* are rendered and received with the greatest enthusiasm. Thence the movement has spread to Spain, where Dr. Gelaberti, of Barcelona, has paid much attention to the subject. An enthusiastic public conference was held at Barcelona in December last, and the influence of the *crèche* from the threefold point of view, of the infant, the mother, and society, discussed in detail, and the utility of the institution fully recognised. At Prague, in Bohemia, there are three excellent school *crèches* conducted as in Brussels. According to the returns of the lady-president, the above number suffices for a population of 260,000 souls, for the somewhat novel reason that the Bohemian mothers are so indolent, as to make a baby an excuse for abstaining from all out-door labour, preferring to hawk the baby about the streets asking for alms. This would certainly not be a good substitute for the legal prohibition of out-door labour by married women. The Bohemian *crèches* are nearly altogether supported by public benevolence, the charge for admission, as in most Continental *crèches*, not exceeding a penny a day. At Ulm and Heilbron, in the kingdom of Wurtemberg, *crèches* have been recently established on a similar footing to the last-named, their chief characteristic being small payments for admission. Attention is also called in the Society's *Bulletin* to a 'day nursery' at Philadelphia, and to the recent action of the Liverpool School Board, who, it appears, have formed a Destitute Children's Aid Society, having for its objects the supply of clothing to necessitous children and the formation of *crèche* asylums. The Board found that the absence of many children from school was accounted for by their detention at home to take care of (!) their younger brothers and sisters. It is well known to many readers before this time of day, that Liverpool and Leicester are both alike famous for their Herodian propensities. The *crèches* which exist in Liverpool charge two-pence a day for admission, and the total working expenses are put down at from fourpence to sixpence per diem. Their popularity, from some reason or other at present unknown to me, has not yet been assured in Liverpool, the average attendance being very low. A hope is entertained by the Liverpool Society that it will be found convenient at an early date to set aside a room in all the large public (Board) schools for infants of tender years. This suggestion, if developed, might result in the establishment of *crèche* guardian schools throughout England, such as we have seen to exist to such perfection in Brussels. The combination is so fruitful of good results and so excellent in its working, that the most fastidious lover of the traditional and, too often, sentimental 'family circle', could not possibly take offence.

An attempt is being made at Oldham, by the Medical Officer of Health, to establish *crèches* on a co-operative and self-supporting basis. The following extract from the last report (April 1879) of the Ladies' Sanitary Association, affords an idea of Dr. Sutton's proposed plan:—'In addition to voluntary subscriptions, collections through workshops and mills, the mothers should pay 3s. 6d. a week for a child brought to the *crèche* at 5.30 A.M. until 5.30 P.M. And what I desire to bring about is, that we should take the infants from Monday morning at 5.30, to Saturday at 12.30, at a charge of 7s. per week. By this means the child's health will not be endangered by the morning and evening exposure to the inclemency of wintry weather, and the mother would have her night's rest undisturbed, which is all-important to her. There are other good reasons to have them by

* The infant mortality of Portugal was 40 per cent. of the total mortality before the establishment of *crèches*. Even this is only about 3½ above Leicester under one year of age.

the week.' I regret, for the sake of some of your readers, that the 'good reasons' are withheld, for I fear the above will not meet with anything like universal approval. The Continental experience related is decidedly against the co-operative principle, and the utility of weekly residence of a number of children in a *crèche* is without precedent, as far as I am aware, and certainly it is contrary to the principles of sound sanitation. Besides, what would become of the co-operative principle in periods of 'strikes'? It is rather significant that Dr. Sutton remarks that 'had it not been for the unfortunate strike with our hands, I should have brought out the *first* day nursery some time ago'. A movement of this kind, to be successful, must appeal to, and, to begin with, rest absolutely on, well-to-do and benevolent society.

Under the title of 'Infantile Hygiene', and since the above was written, I have recalled local public attention to our enormous infantile mortality, and recommended the establishment of one or more model *crèche* schools, the initiative to be taken by the local sanitary authority. The chairman of the aforesaid authority, who is also editor of the journal in which the correspondence appeared, honoured me with a 'leader', in which he frankly admitted the force of my arguments and the 'imperative' necessity for reform. But, as 'the ladies had hitherto put forth no effort to disseminate information amongst their less fortunate and distressed townswomen', he was not sanguine that the idea would be taken up. There is still hope, however, that the sanitary authority will find a *locale*, and that active benevolence will do the rest. Otherwise, the necessity being admitted, the Local Government Board, which is deeply interested in the subject of 'Infantile Hygiene', must be appealed to in its capacity of central sanitary authority.

If society owes itself a debt with regard to the prevention of infantile mortality, it cannot much longer put off payment. The good effects of *crèches*, and the multifarious benevolent sanitary societies of London, place the Metropolitan infantile mortality from preventable diseases among the lowest of the country. It is high time that certain towns, notably Leicester, had done with theories, and if this cannot be accomplished in any other way than by the removal of the theorists, let that wise sanitary precaution be adopted without delay. Birmingham and Nottingham, and the praiseworthy, benevolent activity of their lady population, to which may be added Worcester, through the exertions of Dr. Strange, and some other towns less familiar to me, are beginning to solve the problem of infantile mortality in the only practical manner, that is, by the establishment of *crèches*, and through them the instruction of poor and ignorant mothers in domestic and nursery management. We have already seen the success attending this system in several countries of Europe, notably in Belgium, whose infant mortality is the lowest on the Continent, and much below many of the English towns, including the otherwise healthy town of Leicester.* From the bottom of my heart, I bid those ladies, and all engaged in this noble mission, God speed.

The Statistical Society have announced that the subject of essays in competition for the Howard Medal of 1880 (with £20 added) is to be 'The Oriental Plague, in its Social, Economical, Political, and International Relations: special reference being made to the labours of Howard on the subject'.

* The rate per 1,000 births for all Belgium is 186 against 205 in Leicester.

THE ORGANISATION AND WORKING OF URBAN SANITARY DEPARTMENTS.*

By J. Maule Sutton, M.D., Medical Officer of Health for Oldham.

At the date of my appointment, January 8, 1873, the estimated population of Oldham was 85,141, and in organising the sanitary department my first step was to divide the borough for sanitary purposes into three districts, my staff of assistants being as follows:—One chief inspector, three district inspectors, a smoke and night inspector, a disinfector, an assistant disinfector, and two clerks. The work assigned to each I now propose to explain as briefly as possible. The duties of the chief inspector consist in a general supervision of the work done by the district inspectors, and the bringing specially before my notice any and every case requiring my personal inspection and attention. He also inspects all cases reported by the district inspectors previous to their being brought before the sanitary committee, visits periodically slaughter-houses, which are seventy-five in number, and the inspection of meat, fish, fruit, and vegetables devolves upon him, to which may also be added all inspections under the Contagious Diseases (Animals) Act.

The district inspectors are responsible for the cleanliness and otherwise satisfactory condition of their respective districts, visiting houses where infectious diseases are reported to exist, and urging parents and others to use every precaution in their power, by isolation as far as practicable, and the free use of disinfectants which are supplied them to prevent the spread of disease; and after the recovery and removal of the patient the house is thoroughly disinfected. I may here mention that the members of the medical profession, with very few exceptions, in reporting cases of infectious disease, as well as the schoolmasters and mistresses of the various schools, use forms supplied from my office for that purpose; and should the certificate from a medical man be endorsed 'not to be visited', his request is always complied with. The fee for reporting each case is 2s. 6d. to the profession, and 1s. to the teachers. Each inspector also, on the discovery of a nuisance, reports it, and a notice is then served on the parties to abate the same. After the lapse of ten days it is again visited, and, should the notice not have been complied with, a second is sent, calling attention to the previous one, and stating that unless acted upon within a given number of days, the person addressed would be summoned before the sanitary committee, when the case would be fully investigated and decided upon. This action refers to all cases of simple nuisance; but where the case is urgent it is more summarily dealt with. When summoned before the sanitary committee, and the case satisfactorily proved, an order expressing their decision is served upon the delinquent, and, failing to comply, the case is then left in my hands to enforce the order by magisterial intervention or otherwise.

In the densely populated parts of the borough, where old property abounds, generally occupied by a low class of tenants, and built in blocks, and under the old *régime* of having one privy to three houses, I have had all the houses numbered, as well as the privies, giving No. 1 privy to Nos. 1, 2, and 3 houses,

* A Paper read before the North-Western Association of Medical Officers of Health at Manchester.

No. 2 to 4, 5, and 6 houses, and so on in rotation. Before I adopted this plan these privies were always in a filthy condition, but now the reverse is the case. Orders are given that the occupiers of No. 1 house clean the privy during the first week, No. 2 the second, and No. 3 the third, and so on. If, on inspection, it is found that the privies are in an unsanitary condition, the inspector serves a notice at sight upon each of three tenants to abate in twenty-four hours; failing to comply, they are summoned before the next sanitary committee meeting, and fined for the first offence 1s., and 2s. 6d. on a repetition of the offence; should they dispute the power of the sanitary authority to enforce a fine, they are then dealt with by the magistrates. The mill lodges or reservoirs are also under their supervision.

The smoke and night inspector, whom I find a very useful officer, visits houses suspected of overcrowding between the hours of twelve at night and two in the morning. When the weather is fine and clear, he takes three or four smoke observations of one hour's duration during the day, but when such is the contrary, he attends at the office from 9 in the morning to 12.30, after which hour he returns home, and commences his nocturnal visits at midnight, when he is always accompanied by some other official, in order that his evidence before the magistrates should be supported. The number of houses examined in 1877 was 310, and in 1878, 571. With regard to smoke, and on this subject, taking into consideration that Oldham is the largest mill town in the kingdom, I may say in the world, I feel I may speak with some degree of confidence. It is well known that careful attention to firing, provided that the boiler accommodation be sufficient, is all that is necessary to prevent the black smoke, but I regret to say that there are very few mills in which this is carried out, the firemen in many instances being so extremely careless, that ten minutes and upwards are allowed to elapse between each firing up, and the consequence is that black smoke still pours forth from some chimneys in volumes, filling the air with carbon and sulphur, and thereby producing the most pernicious effects on the health and comfort of the inhabitants, and leaving traces on all behind. To remedy this evil, we should follow the lead that Rochdale has taken, and embody in our future Improvement Acts the following clauses:—(1.) If any fireplace or furnace employed in the working of engines by steam, or in any building used for the purpose of trade or manufacture, or baths, or warehouse (although a steam engine is not used or employed therein), is not so constructed as to consume or burn the smoke arising from such fireplace or furnace, the owner or occupier of the building or lands in or on which such fireplace or furnace is situate shall be liable to a penalty not exceeding five pounds. (2.) If any such owner or occupier, or any engineer, fireman, stoker, foreman, or other person employed by him, uses any such fireplace or furnace not so constructed as aforesaid, or negligently uses any fireplace or furnace so constructed as aforesaid in such manner that the smoke arising therefrom is not effectually consumed or burnt, such person shall be liable to a penalty not exceeding ten pounds. In 1877, 219 smoke observations were taken, and in 1878, 300. I am perfectly convinced that from the adoption of some smoke consumer the black smoke is materially reduced, I may almost say consumed, whilst many of the most experienced cotton spinners have assured me that an actual saving of fuel is effected. I submit the names of the following patentees; nearly all of these patents may be seen in operation in Oldham.

MECHANICAL STOKERS.

Mechanical Stoker Company.—(Henderson's Patent, Liverpool.)		
Proctor's	,,	Burnley.
McDougall's	,,	Chadderton, near Oldham.
H. & J. W. Lees	,,	New Royd Mills, Oldham.
Adamson & Co.	,,	Dukinfield.
William Penny	,,	Ashton. (This may be seen at work at Mr. B. Goodfellow's, Hyde.)

SMOKE AND SULPHUR WASHING APPARATUS.

Johnson.—Smedly Road, Queen's Park, Manchester. (To be seen at work at Goodfellow's, Hyde.)

SMOKE CONSUMERS.

B. Erskine & Scott.—Manchester.	
Broadbent . . .	,,
Gall	Halifax.

Whenever the owners of mills persistently refuse to abate, and act in defiance of the sanitary authority, no course is left but to take magisterial proceedings, a course in all cases I resort to with regret. I have, however, been compelled to adopt this action in several instances, commencing with a magistrate and some members of the Town Council, feeling that as such matters have to be dealt with by them, they at least should be without reproach; and instead of flagrantly offending, should by every means in their power strengthen my hands, and give me the benefit of their weight and influence.

A health-yard is an important feature in every sanitary department. The arrangements of ours I consider complete, satisfactory, and capable of supplying the requirements of the borough, now numbering 111,000 population, for the next fifteen years. Within it are comprised the disinfector's house, the office, a large disinfecting chamber capable of accommodating the bedding and clothing of two cottages, which are disinfected by heat, and subjected to a temperature of 230° Fahr. for two hours. The chamber is fitted with rack shelves of teak wood, and the furnace is situated beneath the chamber; there is also a second chamber for the purpose of burning any articles which are of neither use nor value, such as filthy flock beds, etc. Under the same roof is a coach-house, which contains the fever cab and two vans, one for the purpose of fetching all infected articles in the shape of clothes, bedding, and such like, the other to return the same when disinfected. Adjoining the coach-house is the mortuary and *post-mortem* room, both of which have also proved most valuable acquisitions. To our profession the second undoubtedly is so. *Post-mortem* examinations, when ordered by the coroner, can now be performed with every requisite convenience and accommodation, whereas, anterior to its opening, they were frequently obliged to be carried on in small, ill-ventilated apartments, oftentime at the risk of health and safety, and generally wholly unfitted for the purpose.

The chief clerk is principally employed in keeping the books, records, and statistics of the office, amongst which are the following—

Record of Sanitary Condition of the Houses in the Borough
,, Nuisances.
,, Cases brought before the Sanitary Committee.
,, Half-yearly Classified Mortality.
,, Fortnightly Classified Births and Deaths.
,, Overcrowded Houses.
,, Inspection of Slaughter-Houses.
,, Inspection of Mill Lodges.
,, Smoke Observations.
,, Samples of Food and Drugs.
Sanitary Committee Notice Book.
,, ,, Chairman's Book.
,, ,, Order Book.

Sanitary Committee Non-Compliance Book.
Mortuary Book.
Annual Estimates and Contracts.
Wage, Ledger, Cash-Book, and Tradesmen Order Book.

The junior clerk writes out all the nuisance notices, attends to all inquiries, keeps the record of bedding, clothing, and houses disinfected, manure heap notices, reports to ash department, to nightsoil department, and to borough surveyor, daily health report to officer of health, and, when disengaged, assists the chief clerk.

Hospital accommodation for the reception of infectious and contagious diseases is another and most important feature in an urban sanitary department. Daily experience fully proves that without it the efforts of the health officer, however great, to check the progress of an epidemic, must be all but futile. The urgent necessity for isolation cannot be too strongly impressed on all classes of society, but without hospital accommodation it is almost farcical to talk of it in the homes of the working classes or their poorer brethren. I consider the Westhulme Hospital of the greatest advantage to my borough, and I am happy to say it is held in high estimation by those for whose benefit it was erected.

I regret much that I am not yet able to speak of the building of abattoirs as an accomplished fact in Oldham; but the town council having decided upon their erection, I hope before long to do so. Private slaughter-houses, with few exceptions, are, and must prove, a nuisance wherever they are to be found; in hot weather more especially, the blood, offal, etc., become rapidly decomposed, and not only pollute the atmosphere, but a considerable portion finds its way into the sewers. It must be obvious to everyone that these slaughter-houses studded about towns are injurious to health. Another reason for advocating most strongly the system of abattoirs is the difficulties that would arise in the sale of unsound or diseased meat. Were the butchers in all large towns to slaughter their animals in a certain place, supervision and inspection would become comparatively easy, and diseased meat almost certain of detection, while with due care and vigilance on the part of the sanitary inspectors the sale of it next to an impossibility.

In regard to the construction of houses I make a few suggestions:—

That no privy should in any case (except a blind gable) be less than 10 feet from a dwelling. In all erections to be used as dwelling-houses upon made ground, a bed of cement concrete, or coating of asphalte, or both, should be spread on the entire surface occupied by the buildings thereon, as may, in the opinion of the corporation, through their surveyor, be sufficient to prevent the infiltrations of impure exhalations or gases from such made ground. A damp-proof course, to the satisfaction of the borough surveyor, should be used in the walls of all buildings intended as dwelling-houses, such damp-proof course being below the level of the ground-floor line. When boarded floors are employed on the ground-floor level there should in all cases be left a clear air space of at least 12 inches between the under side of the joists and the surface of the ground, such air space being properly ventilated by means of air-bricks or other suitable contrivances. All bedrooms should have an exit into the chimney breast for foul air, and over the window an inlet for fresh air, similar to the slides applied over railway carriage doors. The external walls of all dwelling-houses should be either cavity walls throughout, and have a clear air space or cavity, at least 2 inches in width, or, which, in my opinion, would be far preferable, a 9-inch wall, a 3-inch cavity, and a 4½-inch inner wall. No plan of cottages be approved which does not clearly show the party walls carried through to the roof. In every case where there are washing boilers, that the same be covered and connected with an outlet for steam into the chimney. That the down spouts in front of houses be connected with the drains.

I wish to say a few words on the introduction of day nurseries into all our large and manufacturing towns. The *crèche* system, which has worked so well on the Continent, I should like to see adopted universally in this country. We purpose very shortly to establish the same in Oldham, and my own idea is that it would be a great thing amongst the operative classes of the population to take the infants by the week, or rather from Monday morning to Saturday night, as well as daily; the mother would then have an opportunity of enjoying the society of her child on Sunday, and narrowly observing its physical condition. It must surely be a great thing for a woman, working all day in mills or factories, etc., to secure a good night's rest undisturbed by her infant, and it will be a great thing for the child to be properly cared for during the night instead of being left to a worn out, tired, and in many cases, careless and negligent mother. It is quite certain that the waste of infant life which is continually going on around us is something appalling, and it has been truly said that a national effort will alone meet the exigencies of the case, and remove the stigma which fairly reproaches us with reckless indifference to infant life and suffering. The direct causes of infant mortality are twofold—those which may be strictly defined as sanitary, and those due to the ignorance or neglect of parents or of those to whom the duties of parents are delegated. With regard to the more purely sanitary causes, including the nature and extent of house accommodation, drainage, water-supply, purity of milk, and other matters, these come within the province of sanitary authorities and officers of health, although a more rapid growth of public appreciation of the value of sanitation, both from an economical as well as a humanitarian point of view, would have a wonderful effect in accelerating sanitary progress. With regard to the second class of causes of infant mortality, which may be summed up as mistreatment and neglect of infants, sanitary authorities and officers of health cannot unaided deal successfully. This is essentially a woman's question, and we must in a great measure look to women for its solution. It is true that in London and other large towns, day nurseries have been for some time adopted, but I hope ere long they will become an institution in all our large centres of manufacturing industry. It appears to me the best and only devisable plan of protecting and saving the lives of young infants, and they would also prove a training school for the rising generation of young females, the lamentable ignorance on the part of whom as to the care and nurture of children cannot be too highly reprobated and condemned.

THE DANGERS OF CHILDHOOD.*

By Horatio Donkin, M.B.

The truth of Tennyson's expressive words, that—

'Knowledge comes, but Wisdom lingers,'

can perhaps strike none more forcibly than those

* A Lecture given for the National Health Society.

who are really interested in the study and promotion of the conditions of health. It must be obvious to everyone at all conversant with even the most general teachings of sanitary science that the extent of the practical application of the principles it has already established is still far less than their number and certainty would warrant, or than a student, unaware of the callousness and ignorance of most of us, could easily be brought to believe. Though it must be admitted that there is still vast progress to be made in the knowledge of those laws of individual life and social well-being, which must underlie all our teachings regarding physical and moral health, and therefore all our attempts at the avoidance of physical and moral disease, there still undoubtedly exists such a body of well-ordered and certain science on these subjects that its small diffusion is at once a matter of wonder and an incitement for its further spread. Legislative measures may do, and are doing, much for the furtherance of good sanitary conditions; but the best progress will be made, the knowledge of the few will most surely become the wisdom of the many, when the principles involved have become matters of intelligent conviction among the individuals who are to benefit from their application.

Especially is this true with regard to the upper and middle classes, whose members, by making this knowledge their own, will not only find their proper reward, but will be enabled to help those of the lower who cannot help themselves. 'It seems certain', wrote Mr. Simon (in 1871), in his report as medical officer of the Privy Council, 'that the deaths which occur in this country are fully a third more numerous than they would be if our existing knowledge of the chief causes of disease were reasonably well applied throughout the country; that of deaths, which in this sense may be called preventable, the average yearly number in England and Wales is about 120,000, and that of the 120,000 cases of preventable suffering which thus in every year attain their final place in the death register, each unit represents a larger or smaller group of other cases in which preventable disease, not ending in death, though often of far-reaching ill effects on life, has been suffered.'

Considerations of space will not permit me to prove by examples how the most well-attested causes of common illnesses are ignored by the masses, as shown in their daily conduct; but though some of this habitual infringement of the laws of health may, to a considerable extent, be due to temporary carelessness of results, and the influence of the pleasure of the moment, yet it is reasonable to believe that an intelligent conviction of the connection between cause and effect in many cases would be a means of preventing a large amount of discomfort and widely-ramifying suffering in the world at large. Probably no amount of physiological teaching, however forcibly given, would avail much to prevent many persons from constantly exposing themselves to the inflammatory influence of sudden changes of temperature, or cause them to forego the fashionable advantages of insufficient clothing; but it may scarcely be too much to hope that the time is not far distant when the light of recent knowledge and lengthened experience may do much to increase the labours of the well-informed sanitary architect, to raise the importance of the medical officer of health, and perhaps curtail the number of grocers' and confectioners' licences.

The dangers of all kinds and diseases to which the impressionable periods of infancy and childhood are subject being very numerous, the matter of their prevention when possible—for it is to this that we must confine our attention—becomes a most important chapter in the study of national health in its widest sense, not only because of the special liabilities of these periods to certain physical and other ills, but in view, also, of the after effects of disease and evil impressions on the man, of whom, as Wordsworth says, 'the child is the father'. The so-called mental and physical states of the human organism are so intimately blended, and subject to such constant action and reaction, that to treat of this subject as fully as it deserves would involve considerations far beyond the scope of the present lecture. I would, however, mention now, that in infancy—that period in which a most important epoch in the building of the brain, which is the mind's organ, is being passed through—much is dependent on the influence of early impressions. At this time those sensations and perceptions take place which, in close connection with hereditary elements, ultimately help to form the mental habit of the adult, and the emotional side of the child's nature now receives much of its permanent colouring. If we give due regard to these considerations, we shall acknowledge the complexity of the influences which contribute to the development of the child, and the many consequent dangers incidental to this time, and shall understand that the more obvious physical evils against which it is the doctor's special province to warn, are not alone those with which childhood's health is menaced.

In calling attention, then, to the chief of these dangers which present themselves to our minds, I shall, first, mention some which arise from the special characteristics of childhood, risks which are common to all on physiological grounds, and are therefore of primary interest. And here the questions of food and warmth will take an important place. Secondly, I shall shortly notice a class of dangers which, though not universal, are still of such common occurrence as to deserve consideration; I refer to diseases of a more or less preventable nature, some of which are due to hereditary causes, and others fall under that class which has been called zymotic. And, thirdly, bearing in remembrance the intimate connection between mind and body, I shall touch on the importance of a carefully-ordered early education, which can no longer be regarded as altogether outside the province of sanitary science in its full and real meaning.

I.—Although there is no strict line of demarcation from a physiological point of view between the periods of childhood and later youth, the processes of growth, and to a certain extent of development, being still continued, we may roughly fix as the later limit of childhood the age of about fourteen—the average time of the approximate completion of what is called the 'second dentition', or the eruption of the permanent teeth. This period embraces an important part of those physiological operations by which the perfect organism is gradually developed. We may look upon this time as essentially one of construction, in which the foundation is laid for the adult structure that afterwards maintains for a time a state of comparative equilibrium, till the processes of destruction and decay, which are always holding their silent course, gain the upper hand, and old age and death ensue as a natural result. These processes of growth and development are carried on with the greatest vigour during the

earliest periods of existence; physiology here teaching us that the rate of increase is slower as time advances. Two points, for our present purpose, must here arrest our attention, viz.: 1. The necessity for the supply of sufficient and proper material for the growing organism to use; and, 2. Fitting physical surroundings to favour the organisation of this material. During the earliest life Nature is our teacher on the first of these points, and would continue to guide us rightly if we intelligently read and followed her dictates. When, moreover, I have stated that heat seems to be the all-important physical force which most immediately concerns the process of the due construction of the organism out of the material presented to it, it will be clear that the questions of food and warmth during the early periods of childhood are of leading interest to us when considering the physical dangers to which this time is liable.

The great demand, then, as it will appear, for the activity of what are called the digestive and assimilative organs in early childhood, renders the want of a supply of material, fitting in quantity and quality, a most common cause of their derangement. The enormous proportion of illnesses and deaths clearly traceable to one or both of these causes, among children of the lower classes, where ignorance and poverty lead often to every possible fault in their mode of feeding, is most striking to the student of preventable disease. It is unnecessary to dwell on the obviously ill effects of an insufficient quantity of food; nor is it within our immediate province; for semi-starvation and its attendant train of evil must ever be an accompaniment of pauperism and overpopulation. But a wide field for prevention of such maladies as we shall allude to is still left open to the promoter of sanitary science, even though their subjects be not of the wealthier classes. Though many children suffer and die from an insufficient quantity of food, many more suffer severely, and many die, from its improper quality, which renders it strictly no food at all. To this cause may be traced innumerable cases of wasting in children—rickets, with all its train of hideous deformities—stunted growth, and crooked limbs—disturbances of stomach and intestines, and many affections which form a vast chapter in the history of children's diseases. It is by no means uncommon for a doctor to hear from the mother of a miserable and wasted child, which numbers its age by months only, that its appetite is excellent, and even voracious; and, on inquiry, to learn that it shares the family diet of pork and potatoes, eating 'whatever we do', as the mother says, with an air of complacent satisfaction that she at least has no share in the production of her infant's malady. Less glaring breaches of physiological law are still more common, and we find many children diseased, and dying starved, from being prematurely stuffed with flour and bread, and various articles of farinaceous material, grouped together under the ironical name of 'Food for Infants'.

For the proper feeding of infants, observation of Nature, and the study of physiology, give us ample lessons. It would occupy too much space to enter into detail on the scales of diet suitable to young children as age goes on. Suffice it to say, in most general terms, that (when practicable) no other food than the mother's milk should be allowed until after seven or eight months at least have passed; and, in default of this, the nearest approach to it according to modern teaching. Should it be necessary to bring up a child by hand, fresh cow's milk, diluted with water or lime water, as the case may be, and with the addition of some sugar, should at first alone be given; or condensed milk, freely diluted. No other food, with the exception of certain cases, should, as a rule, be allowed before six or seven months have passed, after which time farinaceous matters may be mixed, with due choice and proper preparation, with the milk, which must still form the staple article of the child's diet. This exclusion from the infant's early diet of farinaceous food, such as corn-flour, arrowroot, and similar substances, so frequently given in the first months, is fully justified by the disastrous results which frequently follow on its use, no less than by the lessons of physiology. For there we learn that the glandular organs, which serve to render such starch-containing substances really available as food, are not as yet sufficiently developed. Exceptions occur to these rules, of course, as to nearly all; individual cases permitting of individual adaptation; but by this light the course of infants' feeding should be directed.

With regard to the administration of animal food requiring mastication, the obvious indication, though so often neglected, of the eruption of the teeth, is of important value. In the shape of beef-tea or broth, and proceeding through the pounded and finely-cut stages to the ordinary slice, animal food may judiciously be given according to age.

In having confined my remarks, to a great extent, to the evil effects of improper feeding of children among the poor, I would not be understood to think that similar ills do not exist among the rich. It is only of recent years that any carefully regulated diet table for children has been adhered to by many of the upper classes; now, however, the greater belief in the teachings of science which is pervading the community is working some little effect on the practice of those who either possess that knowledge, or can obtain it second-hand.

Still it is not unusual to find the child of the wealthy suffering in common with the child of the poor, from eating the same food as its mother; often, even, drinking the same stimulants. Ignorance in this case is culpable, because remediable with ease, the necessary knowledge being attainable, and the means of carrying it out in practice, the want of which often renders this impossible to the poorer classes, being ready at hand. As the more wealthy classes arrive at a due appreciation of the great importance of appropriate food to the future health of their children, both with regard to its quantity and its quality, and the times of its administration, there is little fear that they will omit to instruct themselves fully on these points; and to take care that their lessons are carried out in every particular. There is a widespread practice, as common as it is doubtless difficult to avoid, which greatly tends to neglect of this subject—I mean that of confiding the care of children almost entirely in their earliest years to nurses and other servants. These, however highly qualified they may appear to be, and for all that they may in some cases be actuated by motives other than that of keeping their places as long as it suits them, cannot be expected to possess much knowledge of the minutiæ of the important duties entrusted to them, or properly to carry out injunctions too often given in only general terms. It is not too much to insist that the young child requires and claims the unremitting careful supervision of the duly instructed mother herself, even for dietetic reasons alone, if the large class of dangers arising from dietetic errors is to be effectually avoided.

To enumerate the various illnesses and untoward symptoms immediately referable to common faults of feeding, of giving too much or improper food to young children, or allowing them to eat and drink whenever they like, would fall more properly under the head of a medical lecture. I cannot, however, insist too strongly on the reality of this causation of innumerable ills in early life—ills which often entail results more or less disastrous. Leaving out of consideration now the important and obvious diseases that frequently spring from errors such as we have pointed out — serious cases of wasting, digestive disturbances, and the many manifestations of rickets, one evil effect of the widespread neglect of this matter is the encouragement of the deplorable, yet popular, tendency of credulously flying, in the ignorance of prevention, to fancied methods of cure, and dosing the already suffering child with nauseous medicines, generally in these cases useless and often harmful. The belief in the curability of maladies by remedies in the form of drugs has always been intense in proportion to the amount of ignorance of the causes and nature of disease. Such medicines, though now regarded by those who know, as chiefly an adjunct to other treatment, are credited with omnipotence by those who, knowing nothing, are ready to believe anything. The faith of past ages in medicine of all kinds, superstitiously given without any intelligible principle or method, has still its counterpart. This is evinced of course most strongly in the practices of the lower classes, on whom the light of knowledge has not yet fully dawned; and whose unquestioning trust in the efficiency of 'doctors' stuff' has stocked the chemist's shop with worthless and pernicious drugs, and contributed to the support of ignorant practitioners and designing quacks. Not content even with waiting till their ignorance and neglect, in the matter of ordinary care, have resulted in making their children ill, and then rushing to drugs to repair the mischief, there are many in charge of young children—and these not always of the lower classes—who cannot even refrain from administering some favourite drug to a healthy new-born infant. And it is not the children of the poor alone who suffer from the system of over-drugging, but often enough those of the wealthy as well, whose monthly nurses, protected by a belief, shared by their employers, in the mysterious necessity of giving medicines, take many opportunities, conducive to their own repose, of dosing their charges with Paregoric Elixir or Mrs. Winslow's Soothing Syrup.

This comforting creed of the omnipotence of medicine—which prevents in its turn any trouble being taken to arrive rationally at the cause of some of the common maladies as they arise—shows itself in more or less hidden ways in all classes, and, as I have already said, not rarely in the higher ranks of society. Besides the common practice of giving domestic medicines without knowledge or advice, we find in many people a complacent belief that sending for a doctor will be sure to compensate for any evil results their own faults of omission or commission may have occasioned. It is, I think, with regard to children's ailments especially, that this deep-rooted trust in treatment by drugs, as the first and the last thing, obtains most widely; a desire that their children should be actively treated, as a kind of set-off to their previous neglect, being shown by many who would perhaps with undue unbelief refuse to take medicine themselves when it might be advantageous. The reciprocal influence of superstitions such as these on the indolent and uninquiring, and the consequent obscuring of the truth, is found too often in the articles of the popular and alluring creeds of homœopathy and other so-called systems, and form perhaps the worst of the evils thereby induced.

Having pointed out the necessity of a due study of the question of nutrition in childhood, as of primary importance, arising from physiological necessities, and hinted at the class of evils likely to result from ignorance on this head, I proceed now to notice briefly the dangers which may arise from the improper clothing of young children, or their undue exposure to weather, a considerable amount of warmth being, as we have seen, a leading desideratum during the time of active construction embraced in the period of childhood. This necessity for warmth is seen most obviously in very early life, a new-born infant rapidly perishing without it. But this necessity continues in an important degree during the earlier years, the strongest children being very sensitive to changes of temperature, and readily parting with their heat. No greater mistake is often made by those who otherwise show care and thoughtfulness in the physical rearing of their children than the endeavour to carry out a false notion that they are hardening them by exposing them to all weathers, even to the cold and damp of our English climate, and for the same reason, or influenced by a regard for appearances, allowing them to be but scantily clothed. It is perhaps somewhat difficult to attain to a proper avoidance of the two extremes of undue exposure and over-coddling in the care of young children. It is common to find that those mothers who clothe their children sufficiently warmly are supremely indifferent, or actively antagonistic, to the requirements of fresh air and exercise, and of good ventilation in the nursery both by day and night. And it is not rare to hear the hardening system advocated by many who are scientifically orthodox on these last-mentioned points. But the fact remains clear, with many undeniable proofs, that the hardening system, carried out as it is unconsciously and unavoidably by our poorer population, numbers its many victims.

The enormous fatality of bronchitis and other chest diseases, apart from constitutional predisposition, and the occurrence of serious gastric and intestinal disorders, all clearly due to cold, as has especially been pointed out by Dr. Eustace Smith, show the necessity of using the obvious preventive measure of keeping up sufficient warmth of body during the period of early childhood. Although I cannot here enlarge on this subject, I would, before passing on, state my full conviction that the well-to-do classes are often much to blame for neglect on this head, and that many long-continued and, at first sight, somewhat puzzling ailments of young children are often found rapidly to disappear with no other treatment than appropriately warm clothing.

II.—We come now to another class of dangers to childhood, which, though not universal, are still of such frequent occurrence as to deserve notice. I mean those constitutional weaknesses and various manifestations of ill-health, due to heredity, and the large class of diseases which are commonly known as infectious.

With regard to the first-mentioned ailments, it will be sufficient to say, in passing, that though the effects of this nature cannot be prevented entirely, yet appropriate care and attention to sanitary surroundings may go far towards reducing them to

minimum. The children born of parents affected in a greater or less degree with scrofula, or coming of a stock well known to be consumptive, as well as those whose ancestors, immediate or more remote, have been afflicted with any of the manifold kinds of so-called nervous affections, such as mental disease, epilepsy, and the like; each and all these have their own special risks to run, against which to be forewarned by due study and attention is to be to a great extent forearmed by resulting precautions. Among such precautions the injunctions already given with regard to food and clothing and other general hygienic measures, apply with particular force; special adaptations, of course, being necessary for individual cases.

Again, as a last example of the purely physical dangers which we shall give, take the widespread group of so-called infectious diseases. This is a class which must have presented itself to the minds of most. It forms a constant source of dread to anxious mothers. The great prevalence among children of diseases which can be caught by one from another has led to their being popularly classed apart as 'children's ailments'. Such are, among others, measles, chicken-pox, whooping-cough, and even scarlet fever; and such has been, and, but for vaccination, would be now, small-pox. A very large proportion of the sickness and mortality which presents so high a rate during the whole period of childhood is due to various forms of so-called zymotic disease. The special victimisation of children by these poisons is probably not due to any peculiarity of childhood, or to any natural indisposition of adults to become infected by them. But it is to be accounted for, as Dr. Bristowe remarks concerning measles, in his well-known work on medicine, by the constant presence of these diseases amongst us, and their great contagiousness, most persons being therefore attacked by them in early life, and thus protected, as experience shows, in the majority of cases, from subsequent seizures.

In the matter of prevention of these obvious dangers, science has still much to teach us. Beyond isolation of cases when they occur, and the use of disinfectant measures to the best of our knowledge, little can be done in protecting ourselves against poisons of so subtle a character as are those which lend to many of these diseases so great a virulence, and of whose nature we are for the most part in utter darkness. One valuable mitigator, or even antidote, we have in the case of perhaps the worst of these maladies, for the frequency and severity of small-pox is demonstrably in inverse proportion to the careful fulfilment of the duties taught us by the splendid discovery of vaccination. For the rest we have no antidote, scientific or otherwise; and we must for the present content ourselves with such avoidance of the risks of infection as the best knowledge dictates, and as is compatible with a quiet life, consoling ourselves for the probability that many such attempts at avoidance will be of little avail, with the reflection that the child, once a sufferer, is for the future protected; that such diseases, serious as they are, are as a rule less severe in childhood than in later age, and with the larger hope that to future generations may come greater security with advancing knowledge.

III.—The close connection and inter-dependence of mind and body, as I have said at the beginning of this lecture, must be my excuse for dwelling for a short time, in the last place, on some of the lessons which strike us, when we consider from this point of view the dangers of childhood. This fact forces itself steadily and with increasing importance on the student of human nature. Let us look at the individual organism with all its varied functions, both mental and physical, as one indissoluble yet complex whole—each of whose separate parts, having a necessary connection with all the rest, cannot be treated independently, and we shall then be able to understand more clearly the frequent examples we see of what we call mental impressions acting directly on the body, not to mention the many varying states of body which profoundly modify the action of the mind. How readily the appetite or the digestion may be arrested by a thought or an emotion; or how, in their turn, thoughts and emotions may have their direction altered by a sudden attack of indigestion or other bodily pain; or how an ill humour may be induced by an east wind, is well known to many of us; and instances of this kind might be multiplied indefinitely. A due attention to bodily health even for its own sake will thus have its share in the production of the object the educator of children has in view of securing a good mental development, and the healthy working of the mind will be aided by the participation of its organ—the brain—in the general well-being of the body. But the proper culture of the mental nature of the child is of two-fold importance. The obvious influence it must have on the mental habit of the adult will strike everyone; the reciprocal effect, that of the mind's impressions on the body, on the other hand, though of far-reaching extent, is not so fully recognised. The physical effects of mental impressions are largely seen in the case of many grown-up people, and are, perhaps, powerful to a great extent in proportion to the want of control shown by the subjects of them. The history of hysteria and allied maladies furnishes us with many instances of this. It is, therefore, of the first importance to pay due heed to the mental surroundings in the early and what we have called, by no mere figure of speech, the impressionable period of childhood. The power of control, though everybody, of course, starts with different hereditary possibilities and predisposition, is largely developed by experience and time, and one of the leading characteristics of childhood on its mental side may be said to be want of control. Hence impressions of all kinds, good and bad alike, are made with favourable or fatal facility on the childish brain, and many events and many lessons which would pass unobserved or fall unheeded by the fuller or fully-grown mind leave often an indelible result on the receptive nature of the child, and become as it were part and parcel of himself.

There are many instances of the evil effects on the body of bad and untoward mental impressions and surroundings. The disease called St. Vitus' dance, of so frequent occurrence in childhood, is most probably set going in many instances (as has lately been ably urged by Dr. Sturges) by an external cause apart from the body which it affects. Several cases can be traced to harsh treatment, some to overwork, and very many to fright.

To overwork of the child's brain as a cause of other forms of disease we can only allude and pass on. Associated frequently with a want of fresh air and physical exercise, which is absolutely necessary to health, this cause frequently leads to many forms of illness in children, and may react in its turn with injurious effect on the after capacity for mental work, so defeating the very object held chiefly in view. I do not intend to teach that bodily disease due to such causes as these is a widespread evil among

children, for I do not believe that it is; but rather to call to mind that insufficient care in the mental and moral rearing of a child may, and does, prejudice its bodily health; and from a wish to impress this fact, that to attain to the completest avoidance that is practicable of the dangers of childhood, we must endeavour to watch every probable line of their approach, and to contribute our little aid to the development of the true health, or sanity, of the entire organism, the 'mens sana in corpore sano'. Here, I think, would apply with greater force and even deeper import the warning I have already given against trusting young children overmuch to the care of hired servants, and here are ample reasons for parents to weigh well their own duties as instructors. Though apparently forgotten and cast out of mind, the early lessons of childhood will frequently recur with force, and reassert their influence for good or for bad. This, then, is the time to seize for giving a right direction to manners and morals—an opportunity once lost, perhaps never to return. How difficult it is for later education and circumstances to make a lady, or still more a gentleman, is a matter perhaps of commonplace observation, which should point a lesson to all parents. Still more should reflections such as these incite them to a careful attention to the positive teaching of their children, and cause them to dread no less than careless neglect the evil effects of impressing the youthful mind with what is false, in compliance with unreasoning tradition, and to save themselves thought and trouble. The simpler the teaching of the child is, the greater the adherence to facts, the less necessity will there be for that difficult unlearning and painful reaction so often observed when questionable theories and unproved notions have found an important place in the early lessons.

It is the duty of the mother, then, as well as of all those entrusted with the care of children, to recognise the teachings of science and apply them. To such as are able, I would say, make yourselves acquainted as far as possible with the well-known conditions of healthy life, and try to learn something of the general laws of Nature which eventually bear upon us all, and by conforming with which we shall make the best progress. Do not rely on traditional maxims or vague and ill-understood notions in the education of your children, but make it a matter, for it is possible so to do, of scientific thought. To do this, to recognise the existence of laws of life and development, not vainly to struggle against them, will not induce in those who think a course of negligence and inertia, but will rather encourage action by enlightening it.

It has been said by one who, recognising profoundly the paramount claims of science, showed, too, the readiest human sympathy and active earnestness of purpose, 'Remember that scientific thought is the guide of action; that the truth which it arrives at is not that which we can ideally contemplate without error, but that which we may act upon without fear; and you cannot fail to see that scientific thought is not an accompaniment or condition of human progress, but human progress itself.' These are the words of the late Professor Clifford. The brightness and depth of his intellect, and the force of his honest teaching, have rendered his early death a national loss, while many can mourn him for the charm of his personal character alone. But his words, though all too few, remain, and his influence will live, not unfruitful, it is to be hoped, in encouraging such a course of action as I have been but faintly endeavouring to indicate.

The acquisition of knowledge of such matters we have touched on is at the present time with reach of many, and could be made, with due e couragement, still more easy. Very many are t books and lectures devoted to sanitary subjects, a it is the chief object of the National Health Socie to spread such information among all classes. Tho who are duly alive to the dangers with which th own children are surrounded, must, or ought to b anxious to assist others less wise than themselve and it is with this object that, among other mea simple lectures are arranged by this Society for t poor women of our crowded districts in London, w are, for the most part, ignorant of the perils to whi their children's lives and health are exposed fr causes under their own control. The whole a of the National Health Society in spreading est blished knowledge and encouraging its practical a plication, whether among rich or poor, is eminen in accord with science, and conducive to the gene good; and is deserving, therefore, of active and i telligent support. But few more ample fields for work can be found than that which is here treat of; for it is in matters such as these, where err often renders cure impossible, that the most fitti application is found for the Society's motto, 'Preve tion is better than cure'.

THE ADVANTAGES OF THE HOUSES BEING NUMBERED IN VILLAGES.

By Elgar BUCK, M.A., M.D. (Cantab.)
Medical Officer of Health to the combined districts of Leicestershir

A frequent complaint of Sanitary Inspectors i that they have no means of accurately describin houses and premises where there are nuisances c cases of fever. As an officer of health, I have ofte found that owing to houses not being numbered, an streets not being named in villages, it is very difficu to find houses to which my attention has been di rected, on account of some nuisance, or of som infectious disease.

In one large village of nearly 4,000 inhabitants, experienced great difficulty in making out the house I was desirous of visiting, although I had the advan tage of the assistance of an able inspector. Whe I am told that there is a case of typhoid fever in th family of Brown, at the village of Slowby (abou 3,000 inhabitants), which consists of one long stree and has several families of Browns, it is possible t walk some distance ere *the* Browns are discovered.

I recommended a Rural Sanitary Authority to hav the houses numbered, and the streets named, in large village of 4,000 inhabitants, and the Authori quite concurred in the advantages to be derived fro such a procedure. The numbering and naming w carried out, and cost about £9, a not very exorbita sum; but when the bill was paid, it was found th the charge could not be legally incurred by the Gua dians, either acting as a Sanitary Authority, or as Board of Guardians.

The advantages of having the houses numbere and the streets named, in a populous, straggli village, are so numerous and important, and the c so small, that it seems advisable that powers shou be given to Sanitary Authorities to defray the charg thus incurred. These powers might easily be giv in the next Sanitary or Poor Law Act, by a sing simple clause.

The following sets of officials would derive adv tage from such numbering and naming.

(1) Officers of Health, and Inspectors of Nuisances; (2) Relieving Officers, and Poor Law Medical Officers; (3) Registrars of Births, Deaths, and Marriages; (4) Vaccination Officers; (5) Education Inspectors; (6) Rate Collectors, Assessment Committees, Overseers, Tax Collectors, etc.; (7) Policemen; (8) Post Office Officials; (9) The inhabitants themselves.

As an officer of health, I very often prefer to enquire into matters quietly by myself, and do not wish to have my object known; so, if I could be directed to No. 12, James Street, Slowby, instead of to Brown's, Slowby, I could easily find it without asking anybody, and without exciting any attention, a by no means unimportant consideration in investigating various circumstances which must often occur to an officer of health.

When officers of health, and inspectors of nuisances, or a Rural Sanitary Authority describe a house now, they have to say, 'house occupied by Snooks, owned by Brooks, in Slowby'; but Snooks may, in the course of a few months, change his abode, and Brooks may sell the house in question; where would then be the means of recognising the house? This is by no means a hypothetical case, as any officer of health, or inspector of nuisances can testify. If the houses were numbered, and the streets named, the officer of health or inspector of nuisances might then accurately describe the house as No. 42, Palmerston Street, Slowby, and this would be shorter and more convenient for the continuous record of nuisances, and house to house visitation list; it would also be a correct description to any one reading the book, and wishing to investigate the matter. Registrars of births, deaths, and marriages have very often, I know, a difficulty in accurately describing persons in their villages; but were the houses numbered this difficulty would disappear, and greater accuracy would be obtained in the registers; an object which I need scarcely say is of the highest importance to the general community.

Vaccination officers now have the same difficulty in giving, correctly and briefly, the addresses of their cases; these officials would be greatly benefited by the numbering of the houses; the vaccination returns would be more accurate, and fewer cases would then be passed over; and thus the public would again receive a corresponding advantage. The new education officials or inspectors would be similarly benefited. Poor-law medical officers would then be able exactly to describe the addresses of cases recommended by them for relief, and the Guardians could easily find out the cases.

The relieving officer has the same difficulty in describing houses as the sanitary official, and he would, on the same ground, be equally glad to have the houses numbered. The rate collector, tax gatherer, overseer, etc., would then have numbers and adequate definitions of their houses; these numbers would be unchanging, and would aid them in the collections, and in giving details in their books.

The same remarks apply to cases of houses under the consideration of assessment committees.

The police would also be benefited, and the general public would have the advantage of accuracy and shortness of description. A policeman now describes a man as 'John Smith of Slowby'; whereas, if the houses were numbered, and the streets named, he could give the address, 'John Smith, 15, Gladstone Street, Slowby'; and it would be easier for summonses, warrants, etc., to be served.

To post-office officials the advantage is too obvious to need any arguments being brought forward.

It would be a great advantage to the inhabitants of the houses to have them numbered, as now they have no means of accurately directing their friends, acquaintances, and persons requiring to do business with them, etc., to their houses.

A short time ago I was told, under a pledge of secresy, of a case of supposed small-pox in a village, which I will call Slowby; the disease had appeared in a family named Thornton. When I arrived at Slowby, I found that there were many families of the name of Thornton, and as I did not wish to excite suspicion or alarm, which might hamper my movements, I conducted my enquiries very cautiously. First, I asked for the nearest Thorntons; on going there, I could hear of no case of illness; then I went on to the next Thorntons, with a similar result; but was then told that the Fred. Thorntons, who lived at the other end of the village, about a mile and a-half off, had a case of illness in the house, so I trudged off there. These Thorntons had not the case I wanted; and on making further enquiries, it seemed that the John Thorntons, who lived in quite another part of the village, were probably the family I was in search of, and thus an hour was wasted in finding the required house. If the house had had a number, and had my informant known it, my time and energy would not have been thrown away in this manner; besides which, I could have shortly and accurately defined the house in my note-book.

In a populous village, the advantages of the houses being numbered, and the streets named, are so important and numerous to so many officials, as well as to the inhabitants themselves, and the expense of having it done is so trifling, that it could not and would not meet with any opposition. Powers could be given to Rural Sanitary Authorities to incur and defray the expenses of numbering the houses and naming the streets, by a single clause in any Sanitary Bill; and I trust such a clause may be included, if any Bill is brought into Parliament next session which is applicable to Rural Sanitary Authorities.

In the village above mentioned, where the houses are numbered and the streets named, the various officials, and the inhabitants of the village, are unanimous in their praise of the plan, and are quite alive to its many advantages. At first it met with a slight opposition, but now the inhabitants are advising their neighbours to do likewise; however, unfortunately, neither the Sanitary Acts, nor the Poor-law Acts, authorise the Guardians to incur any expense for such a purpose, which I venture to characterise as most useful and important.

ON WATER AS AN AGENT IN THE SPREAD OF DIPHTHERIA.*

By Benj. Browning, M.D., L.R.C.P.Lond., S.Sc.C.Edin.,
Medical Officer of Health, Rotherhithe.

The facts I am about to state are, so far as my researches have extended, either almost entirely unmentioned, or else negatived, by standard authorities. As, however, there are reasons for believing that the point in question has not yet been thoroughly worked out, I seek criticism on the evidence, which, after more than ten years' study of various diphtheritic outbreaks, at home and abroad, in town and country, I have collected respecting what appears by no means an unimportant factor in the production of

* Read before the Society of Medical Officers of Health.

diphtheria—its transmission, namely, by the agency of water.

To avoid possible confusion, I wish it to be understood that I speak of diphtheria as referring to a specific disease, specially characterised by lesions almost invariably localised, at their commencement, in the upper part of the fauces, having a peculiar exudation membrane, and followed by more or less albuminuria, blood poisoning, and paralysis; and that I exclude 'genuine croup', 'laryngitis stridulosa', 'muguet', and various forms of 'tonsillitis' and 'scarlatinal' mischief.

Whether this complaint be termed 'diphtheria', 'contagious synanche' (with an s), 'membranous laryngitis', 'angina membranacea', or anything else, it is still one of ill odour, and all avenues by which it may attack the human citadel should be carefully watched and rendered impassable. Without deciding on the correctness of the assertions made by Oertel, Nassiloff, and Ringer, as to its causation by special micrococci, or the denial by Senator that any micrococci beyond the common micrococci of putrefaction are concerned in its origin, it will be allowed, I think, that it is due to a peculiar contagium, and that this contagium probably assumes the form of minute particles, capable of floating in the atmosphere and attaching themselves to various substances; that the exhalations, various matters ejected from the mouth, and even the excreta, of a diphtheritic patient, are infectious, and that the malady has been known to be communicated (*a*) by direct inoculation, as through coughing, kissing, or the partaking of infected food; (*b*) by inhalation of air, surrounding the sufferer, or derived from a sewer or cesspool in his vicinity. Conceding this, there is surely no choice but to admit that water not only may be, but must be, and is very frequently, an active agent in the spread of diphtheria.

Anyone who reflects that diphtheria is far more prevalent in a rural than in an urban district, in spite of the pure air of the former, and the crowded condition of the latter; that isolation, easy in one, is practically impossible in the other; that a city water-supply is, as a rule, much less subject to systematic pollution than that of a country place; that disinfection is more likely to be thoroughly carried out in the town than the hamlet; that the discharges from the sick and their necessary cleansing waters usually find an exit into a sewer of the city, and a cesspool of the villa or cottage, cannot fail to perceive that the country water is almost certain to be poisoned with diphtheritic contagium, should such be present in its vicinity; and that, thanks to the execrable closet cistern so abundant in towns watered on the intermittent system, city water must probably often contain this same venom, whether it be bacterial or gaseous. Reviewing these facts, I must own that the absolute omission of diphtheria in almost every book on hygiene and medicine I have yet read from the list of sicknesses due to contaminated water, appears to me a perfectly incomprehensible oversight.

All sanitarians well know how the water-supply in a district where diphtheria is present is largely exposed to the chance of receiving its contagium, and in the country can hardly escape it. Almost universally, the same water is used for cooking, drinking, and washing purposes, without any, or at best an imperfect, filtration. Assuming that this water contains diphtheritic germs (which, according to Dr. Thursfield, Dr. Mackenzie, and others, have retained their vitality, in some recorded instances, for quite three years), are not these likely to be implanted, not only in the throat and food passages of drinkers, but also on the walls and floors of apartments, of course, in the latter case, by the process of washing and drying, and being thence subsequently detached, to find a nidus in man or animal, and thus be the cause of a future epidemic? May not the sudden and simultaneous appearance of diphtheria in various houses, sometimes observed to have had no communication with each other, and where no contagion is to be traced, be thus accounted for?

Is there not a probability of diphtheritic virus being in this manner accidentally transferred to a house where the complaint has been hitherto unknown, and of remaining harmless for a time, till a fitting prey is provided in the person of a child or otherwise susceptible subject? And may we not thus explain the uncertain periodicity and location of diphtherial invasions? I am at a loss to comprehend how anyone accepting the doctrine of a fluid transmission of scarlatina and typhoid can refuse to allow the same privilege to diphtheria. The verdict, after due inquiry, should, I submit, be rather 'not proven' than 'not guilty'.*

This appears also to be the opinion of Mr. Power, of the Local Government Board, who, in his recent valuable Report respecting the prevalence of 'throat illness', as he terms it, in the North of London last spring,† attributes the origin of the outburst he was directed to investigate to the milk-supply of parts of that locality becoming affected, and states that he has only arrived at negative conclusions as to how it was vitiated.

He is not disposed to credit water as a cause of the milk infection, since the milk vessels at Kilburn Dairy, one of the two centres of propagation, were washed 'with good West Middlesex water', and the well at the other was 'of doubtful character'. But, as he states that the sanitary arrangements of most of the houses in the affected districts are faulty, and the sewers often 'strangulated', and we know that this London district does not differ from others as to the presence of closet cisterns serving in a threefold capacity as ventilators for the sewers, flushers for the 'w.c.s', and drinking water tanks, and also as to the adulteration of milk with water by retailers, after its purchase from the dairies, there is some *primâ facie* evidence against water as a not unlikely accomplice of the guilty milk. The facts, which now from my own experience, I am about to lay before you, will perhaps justify my audacity in venturing to differ from Trousseau, Squire, Röth and Lex, Sannie, Seiz, Parkes, and de Chaumont; and the corollaries I gather from it are, at all events, unbiassed.

Diphtheria first came under my notice in 1859, whilst serving Her Majesty on the Australian station. The mails of 1858 had brought us news of it as a pest in Europe, and the heads of the profession in the Antipodes were on the look-out for its importation. Nine cases were detected in Sydney, the origin of which baffled everyone's inquiries, as did the first few of the 200 odd seen in North Tasmania. All the emigrants have to leave the old continent in good health, and had any been sick from communicable disease on the voyage, or when entering their respective ports, they would not have been permitted to land without undergoing a rigid quarantine. Certainly, in Sydney, at that time, there was every facility for the spread of zymotic disease, for the city, in its sanitary aspect, was much like London at the date of the first Health of Towns Commission;

* Sanitary Record, vol. x, pp. 243, 275. † *Ibid.*, vol x, p. 16

but diphtheria showed itself soon after an arrival of emigrants, and as no primary infection could be discovered, if, as was universally supposed, these people introduced it to the colony, they must have brought its germs there in their clothes and belongings, and developed it by washing their property on shore. As the insanitary conditions of Sydney were then much the same as they had been since its foundation in 1799, and no diphtheria had been previously known, this new ailment was judged to be brought, as well as certain moral ones, from the mother country, the physical evil rather by the agency of washing than of drinking water (a beverage scarcely ever partaken of there without wilful adulteration).

In December 1870, a case of primary diphtheria, of most severe type, occurred in the family of a gentleman residing in a village in East Kent. The water-supply of his house was taken from a sewage-polluted river, running through his grounds. Its sanitary arrangements were said to be perfect, an assertion to which, with my present cognisance of hygiene, I must demur.

In spite of the most complete isolation of the patient from the first, and of every successive case subsequently occurring in the dwelling, not one of the household (fourteen persons in all) was exempt from the epidemic, the latter patients being nursed by the convalescents, who thus reciprocated their friends' attentions.

Between Christmas 1870, and March 1871, forty cases came under my care in the parish, four of which, in one house, that of a carpenter, were fatal in less than a week from the appearance of the first, death being due to the gangrenous form of the malady. Fourteen others, of the croupous variety, were noticed, and the remaining eight were of the catarrhal kind.

The total mortality was one in ten attacks. The water-supply of every house, where not drawn from the river, was from shallow surface wells in superficial gravel, usually close to cesspools. We could hear of no other diphtheria within a radius of seven miles, or indeed within our ken, and my predecessor informed me that there had been no instances in the country-side for quite ten years. The affected houses were variously situated, some on high land and dry soil, some near woods, some in 'bottoms', and close to springs or damp ground, some on the river bank, some singly, some in groups, but one and all were in the immediate proximity of hop grounds. Within a week of the first seizure, I had five more distinct and separate foci; and after the strictest investigation I could not trace their origin to any direct communication with each other or with extrinsic sickness. I have mentioned the previous immunity of this parish. I may state that during the next six years there was one solitary instance of diphtheria there. What was the exciting cause of this epidemic I have now reported? Does it not appear fairly attributable to accidental water pollution, probably fæcal, possibly manurial, rather than to direct personal contagion, or atmospheric miasmata?

In the spring of 1872, I had to attend twenty consecutive cases of diphtheria in another Kentish parish, situated on the top and sides of a chalky undulating down, with water entirely furnished by surface supply, there being no river within some miles. I noted four separate sites almost simultaneously invaded, which were widely distant, and never, from the first, had any communication with each other, except through the visits of the clergyman and myself. There were no more diphtheritic patients to be heard of in that part of the country. Three of the victimised places were detached cottages, in various parts of a plateau. The fourth was a collection of four single houses and one double one, arranged as three sides of a square, on the top of a high table-land, the fourth side being open. The sanitary appliances and surroundings of all the buildings in which there was diphtheria were of the customary rural type, pigsties, cesspools, and wells being in close proximity, and the wells, in addition, all fouled by surface drainage of the neighbouring hop gardens. Their water, in each case, gave ample evidence of organic pollution by rough qualitative tests. The inhabitants of the square were supplied by a single central well, and in every house having children, with one notable exception, I witnessed diphtheria. This exception occurred in a part of the double house whose occupants would not drink from the well, but brought water (which, on examination, proved fairly pure) daily from a neighbouring farm. The square swarmed with children, and the five families being more or less related, carried on the freest intercourse between sick and sound during the prevalence of their malady. Their mortality was also one in ten. The hop gardens were then being largely manured with 'fish stuff', and the first case happened in a solitary house, nearly a mile from the village street, and directly underneath one. Here was a probable instance of water pollution, as hop manure is not seldom a compound of the vilest town filth and refuse.*

That the well in the square was an agent in spreading diphtheria seems proved by the exemption of those who did not use its water, but were otherwise exposed to the same chances of infection as their neighbours who did.

In 1875, I met with seven cases of diphtheria in the family of the master of a railway station in another Kentish parish, and two others, nine in all. I could ascertain no previous contagion, but found the existence of the customary polluted shallow well, close to the public latrine, the whole premises being isolated, standing on a lofty chalky embankment. Two casual visitors to the station (not to the dwelling-house) who drank some water in the waiting-room also contracted the disease. There was no more of it before or afterwards in this parish while I knew it.

Was not this an example of water infection? Taking my Metropolitan experience as a Medical Officer of Health, now of one year's standing, I find that in every house which I have inspected after the occurrence of diphtheria, the water cistern or butt has given me a much larger quantity of organic ammonia than it should have done. The water-butt was invariably associated with defective drainage, allowing a free escape of sewer air into the court. The cistern never failed to receive and store whatever gases, harmless or lethal, chanced to pass through the house-pipe and sewer.

I would suggest to you that in the country epidemics I have mentioned, at their commencement, no direct personal contagion could be made out, although it was anxiously sought for; that aerial infection seemed everywhere contra-indicated, owing to the open and breezy situation of nearly all the implicated dwellings; that in all the drinking water was organically impure, and received surface filth of every description, and that in the town cases there

* *Vide British Medical Journal*, 1872, vol. ii, pp. 95 and 96.

was also clear evidence of water pollution by sewer gas or fetid emanations, if not by actual deposit of dirt. And I venture to submit that I have therefore supplied some of that 'evidence' which is by Dr. Parkes and others deemed 'still wanting' to prove the 'production of diphtheria by contaminated water'.* If I am in error, I share (as I find since I commenced this paper) my heresy as to one form of the causation of diphtheria with such men as Drs. George Johnson, Wynter Blyth, George Wilson, and Morell Mackenzie.

But the fact that I have just succeeded in infecting two kittens with this disease, by feeding one with milk mixed with water in which I had kept diphtheritic false membrane and sputum, and the other with milk adulterated with water taken from the cistern of a house where a fatal case of diphtheria had recently occurred, causes me *permissu superiorum*, to maintain the opinion which I have always entertained, that diphtheria may be, and often is, spread amongst the community by the agency of water. [Microscopic sections of the diphtheritic membranes from these animals were shown after the meeting, and pronounced to be identical with specimens taken from human beings.] In some recent reports as to the sanitary condition of various residences tenanted by illustrious families who have suffered from the ravages of diphtheria, I have seen no mention of the details of water-supply. Probably this point was over-looked; possibly it seemed better to the reporters to preserve a judicious silence regarding it.†

In any case I am sure I shall meet with cordial support as to the absolute necessity of improving the present system, if not of water-supply, of water reception and storage in towns, and of providing water in the country.

I am not singular in deeming the Metropolitan water, including the Southwark and Vauxhall or Lambeth, to be practically good, as delivered at the mains, but I find even the Kent water (taken by Dr. Frankland as the standard of purity) to be more polluted, as shown by the organic ammonia, in many instances, after a few hours' storage in a cistern, than the effluent sewage water from the sewage farm at Croydon.

MORTALITY STATISTICS OF ENGLISH AND WELSH WATERING PLACES IN 1878.

We are enabled, through the courteous co-operation of the medical officers of health, to publish, in an accompanying table, uniform mortality statistics for twelve English and Welsh watering-places, relating to the year 1878. The vital statistics of watering-places and health resorts, at all times interesting to holiday makers and valetudinarians, have especial value at the present season. The official statistics of these health resorts, published each year by the Registrar-General at the beginning of August, although strictly accurate, so far as they go, are eminently unsatisfactory from more than one point of view. In the first place, the statistics, instead of relating to the sanitary districts, only purport to be those of the registration districts or sub-districts, most nearly corresponding with the several health resorts; this difference of boundary detracts from the value of the Registrar-General's figures, although not to the extent which is sometimes asserted. Secondly, the Registrar-General's figures only embrace the second or spring quarter of the year, a period too short to afford trustworthy statistics for comparative purposes, although supplying useful indication of the local health conditions. With a view to providing mortality statistics for watering-places which should be free from the objections which are so patent in the Registrar-General's table of mortality of watering-places, we recently addressed a circular to forty-eight medical officers of health of English and Welsh watering-places, asking for uniform statistics relating to the year 1878, and asking their co-operation in securing, for future publication, periodical returns of statistics for those sanitary districts. It is with great regret that we are not enabled to publish those statistics for more than twelve of the forty-eight sanitary districts. A brief consideration of those figures, however, will sufficiently prove the value of such uniform statistics, and encourage a hope that on a future occasion we may meet with more general co-operation in our endeavours to obtain and to publish, for general and local information, sanitary statistics which may usefully and easily be compared. We are aware that the medical officers of health of the far larger proportion of such small urban sanitary districts as most of our English and Welsh watering-places, receive but nominal salaries, and that statistical returns are neither required or favourably entertained by many sanitary authorities. Notwithstanding these drawbacks, however, we can scarcely doubt that all who have the best interests of watering-places at heart, will not be difficult to convince that the publication of such statistics as we now present to our readers for twelve English and Welsh watering-places, cannot fail to be conducive to the prosperity of those communities, as well as useful to the public which patronise those health resorts.

A reference to the accompanying table will show that the death-rate from all causes, during 1878, within the urban sanitary districts of these twelve watering-places, ranged from 14.0 and 15.2 per 1000 in Sandown and Littlehampton; to 21.2 and 23.6 in Brighton and Bangor. The lowest death-rates from zymotic diseases were 1.0 and 1.1 per 1000 in Littlehampton and Ilfracombe; and the highest 3.0 and 4.0 in Teignmouth and Llandudno. The death-rates from fever were exceptionally high during 1878 both in Torquay and Teignmouth.

The death-rates from acute diseases of the respiratory organs in these watering-places are especially instructive, and show a range of variations for which we were scarcely prepared. The annual death-rate from those diseases, in 1878, which did not exceed 0.8 and 1.3 per 1000 in Llandudno and Littlehampton, ranged upwards to 5.0 and 6.6 in Dawlish and Brighton. It is dangerous to generalise and to draw conclusions from the experience of a single year, and there are good reasons for believing that the death-rate from these diseases depends almost as much upon the sanitary condition of a population, as upon the climate of the locality in which it resides. The fatality of acute diseases of the respiratory organs calls for further enquiry; as for comparative purposes, it is probably not seriously disturbed by the deaths of visitors.

Infant mortality, measured by the proportion of deaths under one in these twelve watering-places during 1879, calls for some notice. This proportion did not exceed 87 and 111 per 1000 in Ilfracombe and Sandown, ranged upwards to 157 in Llandudno, 170 in Dawlish, and 172 in Brighton. The high ra

* *Vide* Parkes, 5th edition, p. 55.

† See SANITARY RECORD, vol. ix, p. 436—(The Drainage of Darmstadt).

STATISTICS OF TWELVE ENGLISH AND WELSH WATERING PLACES IN 1878.

Urban Sanitary Districts.	Estimated Population middle of 1878.	Births.	Deaths.	Deaths of Persons aged					Deaths from												Deaths in Public Institutions.	Annual rate per 1,000 persons living.				Deaths under one year of age to 1,000 births.	Medical Officers of Health.
				0—1 year.	1—5 years.	5—15 years.	15—25 years.	25—60 years.	60 years and upwards.	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria.	Whooping-Cough.	Fever (typhus, enteric, gastric, and simple).	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.		
Hastings	39,780	1,084	669	136	91	*	*	*	18	70		3	7	3	26	19	12	132	101	15	18	27·2	16·8	1·8	3·3	125	C. Ashenden.
Brighton	103,923	3,085	2,203	531	262	*	*	*	525	241		22	8	4	8	16	5	68	229	56	327	29·7	21·2	2·3	6·6	172	K. P. E. Taaffe, M.D.
Worthing	9,196	265	168	31	13	2	8	49	65	20								26	19	1	2	28·8	18·3	2·2	2·9	117	C. Kelly, M.D.
Littlehampton	3,940	114	60	15	5	1	1	14	18	4			1	1	1		1	5	10	*	*	28·9	15·2	1·0	1·3	132	
Sandown	2,850	90	40	10	6	1	3	9	11	6								10	4	*	*	31·6	14·0	2·1	3·5	111	J. Neal, M.D.
Dawlish	3,790	94	73	16	5	3	4	17	28	9						1	3	19	4	4	*	24·8	19·3	2·4	5·0	170	L. Armstrong.
Teignmouth	7,000	197	129	24	19	2	7	32	45	21		3			3	7	3	25	13	5	*	28·1	18·4	3·0	3·6	122	W. C. Lake, M.D.
Torquay	25,000	642	401	67	49	21	23	107	114	41		9		4	7	11	10	98	62	7	12	25·7	16·0	1·6	3·9	135	P. Q. Karkeek.
Ilfracombe	5,300	137	92	11	12	2	3	31	43	6			2		2	1	1	*	13	1	1	17·4	11·1	1·5	7·5	87	E. J. Slade-King, M.D.
Bangor	8,170	*	193	41	26	9	7	44	66	18			1		14	1	2	*	16	2	*	23·6	23·6	3·2	0·8	*	
Llandudno	4,766	153	88	24	4	3	2	23	32	19			3		2	1	11	4	12	4	*	32·1	18·5	4·0	0·8	157	H. Rees, M.D.
Lytham	5,000	118	87	18	16	10	8	16	19	10			2		2		2	16	9	6	1	23·6	17·4	2·0	3·2	153	W. Pountney, M.D.

* The information required to fill these columns was, for various reasons, not supplied by the Medical Officers of Health.

of infant mortality in Llandudno has before been noticed in these columns, and it cannot be considered satisfactory to find that 16 deaths under one year of age were registered in Dawlish last year, although only 94 births were recorded. It is often asserted that infant mortality is more a social than a sanitary question, but it is evident that the sanitary condition of a population (using that term in its larger sense) cannot be considered satisfactory, if the rate of infant mortality is remarkably excessive.

We shall hope to be able, from time to time, to publish periodical and uniform statistical returns relating to the health and mortality of these twelve, and of other watering-places and health resorts, as well as statistics of other urban sanitary districts. As the *Sanitary Record* is now published on the 15th of each month, all uniform statistical returns, either monthly or quarterly, which are now received at the office of the journal during the first ten days of each month, can appear in the forthcoming number of the journal. Post-card forms for the transmission of the statistics will be furnished to any medical officer of health who communicates his readiness to co-operate in this effort to provide completely trustworthy and uniform statistics of sanitary districts.

THE

SANITARY RECORD.

JULY 15, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

COMBINED SANITARY DISTRICTS.

WE commence in the present issue of the SANITARY RECORD a series of reports on the combined sanitary districts of England and Wales, which we believe and are assured will be of assistance in enabling a right appreciation of the results of these combined appointments to be arrived at. It needs hardly to be said that the materials for coming to any decision in the matter are of the most fragmentary character. A very large proportion of the reports on combined districts are not printed at all, or printed in a very unworthy fashion in local newspapers or the like. In other districts, again, it is the practice to publish the reports to each authority separately, with no sort of general report to accompany them. Thus it is rendered extremely difficult, if not impossible, to judge in any satisfactory way of the work performed by the medical officer of health in his district as a whole, or of the improvement in its public health which has been effected by his labours, or generally of the working of the combination itself.

The facts which we shall give as to these districts can thus be only of a very imperfect kind, and must necessarily concern more the reporting than the work.

Any conclusions, therefore, based on reports alone, would obviously be fallacious to a greater or less

degree, and nothing short of a government inquiry would bring out the real facts of the case as to these combinations. That this inquiry is wanted for the purpose of settling the future line of action with regard to the appointment of medical officers of health will amply appear from what follows. It would be premature at present to indicate exactly the lines upon which this inquiry should proceed, but it is evident to the most casual observers that the present hand-to-mouth system cannot much longer be tolerated.

All those who have studied the question of the medical supervision of the public health have arrived at the decided conclusion that the combination system is the best. To appoint a man who is subject to the harrassing cares of private practice, and whose zeal for sanitary improvement is necessarily largely tempered by the effect which its enforcement would have upon the goodwill of the persons upon whom he is dependent for his livelihood, is to render almost nugatory the principles of the Public Health Act. We are by no means saying that there are not many men who are fulfilling the duties of medical officers of health for small districts with conspicuous zeal and self-denial, seeing that their pecuniary interests are in every way opposed to sanitary reform. But we unhesitatingly assert that a large proportion of such appointments are of little more than nominal value, and of no practical utility. To properly fill the post of medical officer of health requires qualifications which the average medical man does not, and cannot be expected to possess. It is unnecessary here to show how very far the ordinary professional training falls short in its teaching of hygiene, as this is a matter which is sufficiently palpable. To assign, as has been done in too many unions, the duties of medical officers of health to the poor law medical officers, as an inconsiderable addition to their functions, remunerated by a corresponding percentage on their poor law salaries, has been proved by experience to be a device of the most unsatisfactory character. The Local Government Board have therefore lately taken every opportunity of discouraging such appointments, and of insisting upon a better arrangement being made.

The suggestions, however, of the Board, as now made, seem to us to be open to equal objection, since they only perpetuate and extend a system which cannot be expected to yield any results of real value. Our attention has been drawn by numerous correspondents to the emphasis with which the Whitehall authorities now suggest the appointment of one officer for the whole of the area of a rural district, instead of dividing the duties amongst several; and it was only a few days ago that we received a communication from a subscriber speaking of the Local Government Board ordering the four sub-districts in his union to be combined, and one officer appointed for the whole.

There is something to be said for this, but as the salary offered can hardly ever be sufficient to enable a man to give up the whole of his time to the performance of sanitary duties, the objection remains the same. No independence can be felt by such an officer, and his sanitary duties, more onerous than those of his numerous predecessors, will evidently become, sooner or later, irksome and unpleasant.

The real solution of the difficulty is to appoint skilled persons for the medical supervision of districts of such size as to employ their whole time, and to offer such a salary as will attract men of ability to the service. Two points of importance must, however, be borne in mind—(1) that the appointment has some reasonable security of tenure, and (2) that the district is not so large as to be unworkable. The present system of limiting the appointment of a "combined" Medical Officer of Health for a period of only two or three years is fraught with the very worst results. There may have been some justification in the very early days of these appointments for a certain caution, with a view to allow of subsequent improvements; but as no further legislation on the subject seems likely to be brought forward for some considerable time, there can be no sort of reason for continuing this limitation for such extremely short periods. At the best the bond which unites sanitary authorities together is of the most gossamer kind, and it is in the power of any one single authority with notions of miscalled "economy" entirely to break up these combinations. Two such cases, both of a very glaring kind, and both possessing the same features, are at this moment before the public. Dr. Wynter Blyth and Dr. Cornelius B. Fox are both well known, not only as skilled medical officers of health, but as men of varied scientific attainments. Any district which possesses the services of either of these gentlemen should congratulate itself upon having the very best sanitary advice at its command. Yet in the one case the Okehampton rural authority, and in the other the Billericay rural authority, both alleging economy as their motive, have expressed their intention of declining any longer to continue in their respective combinations. The Okehampton case is, we believe, not yet settled, but, as regards Billericay, it is different. We feel sure we only express the regret of the whole of the sanitary world when we announce that in consequence of the action of the Billericay authority the services of Dr. Fox are lost to hygienic science. Dr. Fox has decided not again to offer himself to the two authorities who are probably willing to reappoint him, and thus there is every probability of the combination breaking up.

The position of the Local Government Board in this matter is indeed most regrettable. Why they should allow so skilled, so invaluable a man as Dr. Fox to be lost to the public health service of the country is probably only known to themselves; and of what use are the compulsory powers given by section 286 of the Public Health Act, if they are not utilized in cases like this, we entirely fail to see. In a precisely similar case, that of Royston, on which we have often commented before, the same indifference to the continu-

ance of these combinations was shown, and we are afraid that this can only mean that the Board are bent upon not encouraging combinations in future. At least, they are allowing sanitary authorities to back out of them without remonstrance, as Dr. Syson, and Mr. Haviland whose district has recently been lessened by the loss of the Pottersbury rural district) can testify by sad experience.

We are not saying too much when we assert that this lukewarmness on the part of the Local Government Board, is doing the greatest possible mischief to the public health of the country. When sanitary authorities see that they may with impunity substitute an efficient and skilled officer, by some cheap and nasty arrangement with two or three local medical men, who will make things more pleasant for them, and not suggest improvements that cost money, it is small wonder if they do so. There are indications all over the country that these combinations are breaking up, and it is high time that some systematic action should be taken to prevent such a catastrophe. We think that a Government inquiry should, without delay, be instituted as to the way in which the now existing combinations have worked, so that some general principles may be laid down for the prevention of calamities such as have befallen Dr. Blyth and Dr. Fox. Incidentally, this inquiry would have to take cognizance of the dimensions of the present districts, and of their workability. Many of them are notoriously unwieldy and unworkable, and this may account in some measure for the desire of local authorities to break these up. The case of Oxfordshire is one of them. The late officer, Dr. Gilbert Child, was a man of great energy and skill, with perhaps more of those qualities than of prudence. His fearless denunciations of the existing state of things have met with their usual reward. When his term of office expired, the question of his re-appointment was not even considered, but an entirely different selection was made. We regret very much that with this change of officer, an alteration was not made with a view of making the district more compact. It is now virtually divided into two separate parts, which are not readily accessible the one from the other; and its area is 520 square miles. Situated as it is, we believe that we are safe in asserting that it is far too much for one officer to work satisfactorily. As we have before said, many of these combinations were formed in a hap-hazard way, when the Local Government Board was only too glad to find any Authorities willing to combine. The consequences of this ill-considered haste are now recoiling on the unhappy officers who have sacrificed other professional prospects to join the sanitary service. The present action of the Local Government Board is, to say the least, not calculated to attract men of ability to become medical officers of health: and if the class becomes degenerate, the Board will have only themselves to thank for it.

Our observations on the subject of combined districts would hardly be complete without a reference to a flaw in the Public Health Act which has come to light during the correspondence on the subject of Dr. Ogle's ejection from the office of Medical Officer of Health of the Royston rural district. We have already discussed this case in all its bearings up to a certain point, and we do not therefore again state the facts, although they considerably strengthen our previous argument. It will be remembered that the Local Government Board, after threatening to issue a provisional order compelling Royston to remain in the combination, ultimately yielded and allowed the Authority to have their own way, and appoint a separate officer. The Authority chose, however, to fill Dr. Ogle's place, a poor-law medical officer, whose employment as medical officer of health had necessarily, by section 191 of the Public Health Act, to be assented to by the Local Government Board. This assent the Board very properly, under the circumstances, refused to give. The astute Authority thereupon prevailed upon the officer in question to resign his poor-law appointment, then elected him to the post of medical officer of health, and, afterwards, reappointed him district medical officer. In this way they evaded the requirements of section 191, as, at the time of his election to the sanitary office, he was (not having at the moment any poor-law appointment) independent of the control of the Local Government Board. His subsequent re-election as district medical officer was justified by the argument that he was the only medical man residing in the district; and thus the Whitehall authorities were placed in an awkward predicament. To have refused sanction to his appointment as district medical officer would have been to assume a serious responsibility as to attendance on the sick poor in cases of dangerous illness or sudden emergency; and the Board, feeling probably that they had been checkmated, ultimately conceded the point. Whereupon the guardians coolly asked for a part of repayment of their new officer's salary. This the Whitehall Board have, in uncompromising terms, refused to entertain for a moment; but it cannot be said that they come out of the conflict with flying colours. If ever there was a case in which a compulsory order should have been issued, Royston was that case; and it cannot be doubted that the policy of the Board, in shirking a provisional order, has had a most injurious tendency to weaken the bond which keeps other combinations together. Section 286 of the Public Health Act was expressly provided for these very cases; but it seems hopeless to look for any advantage being taken of it.

Here, for the present, we must leave the subject; but the conviction is gradually forcing itself upon us that some exhaustive inquiry will have to be made before long as to the manner in which the sanitary business of this country is conducted, if the whole of the machinery is not to be thrown out of gear.

ALCOHOL IN WORKHOUSE INFIRMARIES.

THE advocates, as well as the opponents, of alcohol, as essential to the diet of invalids and hospital patients, should alike recognise the value of Dr. Webster's report to the Guardians of the St. George's Union upon the work carried on in their workhouse infirmary during the year ending Lady-day last. This workhouse infirmary was opened for the reception of patients towards the close of February 1878, so that the report recently issued relates to the first year's existence of this institution. It may be hoped, however, that some arrangement may in future be made by which these reports will relate to the natural year ending December, instead of an arbitrary year ending Lady-day, which interposes difficulties in the way of comparison, that it is always desirable to avoid. It appears that at the opening of the institution the guardians furnished their Medical Superintendent with a copy of the 'Report of the Select Committee of the House of Lords on Intemperance', and asked him seriously to consider the consumption of stimulants in the infirmary. Dr. Webster was, after full consideration of the subject, induced to take the opportunity of the opening of this new institution 'to attempt the introduction of the non-alcoholic method of treatment'. This system was introduced gradually, and in a tentative manner, until the 'infirmary contained 670 patients who were living from day to day without beer or brandy as an article of diet, and without any deterioration of health due to the deprivation'. The figures in the report afford striking evidence of the thorough manner in which the experiment was carried out. The average number of patients in the St. George's Union Infirmary during the year was 559, and yet the cost of all the ale, wine, and spirits consumed by the patients during the year did not exceed £8. Dr. Webster gives a table in his report which shows that in five other workhouse infirmaries, the average number of patients in each of which was smaller than that in St. George's Union Infirmary, the annual cost of alcohol ranged from £278 to £625, and averaged £486. Although, as Dr. Webster points out, alcohol has not been 'rigidly tabooed', its cost during last year did not average more than three-pence for each of the average number of patients; whereas the cost of ale, wine, and spirits in the five other infirmaries averaged £1 6s. per patient. We are told that the rate of mortality during last year in the St. George's Union averaged 12·5 per cent. of the patients under treatment; while in the five other infirmaries it ranged from 10·5 per cent. in the Central London Sick Asylum at Highgate, to 19 per cent. in the Poplar and Stepney Sick Asylum. It is worthy of note that both the highest and the lowest proportional mortality occurred in those infirmaries in which the largest amount of alcohol was consumed. Dr. Webster, however, appears justified in assuming that his mortality statistics afford no evidence that the health of his patients suffered on account of their non-alcoholic treatment, for it is a fact, that the proportional mortality in St. George's Union Infirmary was below the mean rate of mortality in the five other workhouse infirmaries. Dr. Webster, in commenting upon the small quantity of malt liquor consumed in his infirmary, 'less than a pint per day for the whole building', states that milk had been supplied in lieu of beer, and urges that this change, while generally beneficial, is infinitely useful in detecting and reducing the number of malingerers, which is somewhat large in pauper infirmaries, more particularly during winter. Patients who, for the sake of extra diet and complete absence of the smell of oakum, are inclined to prolong as long as possible their residence in the infirmary, often find themselves immediately ready for discharge when their allowance of beer is withheld. Thus there is a sound element of economy in the non-alcoholic treatment, although there may not be much net saving in the substitution of milk for beer. It is specially noted that more than thirty old women who, at the time of their removal to the new infirmary had been bed-ridden for from one to seventeen years, and had been supplied daily with brandy or beer, or both, have since so improved under non-alcoholic treatment as to be able to leave their beds; many of them are said to be now able to walk about, and some to be fit for work. This is attributed to the improved appetites and food assimilation induced by the withdrawal of alcohol. Dr. Webster does not assert that the limited series of facts, which his year's experience has enabled him to embody in his report, afford trustworthy ground for 'positive conclusions upon the question of stimulants', but all will be ready to admit that his experiment is full of interest, and appears to have been sufficiently successful to warrant its continuance, under careful observation, and its repetition elsewhere, under similar conditions.

THE FUSEL OIL QUESTION.

THE proposal in Mr. O'Sullivan's Bill to make it compulsory to keep spirits in bond one year is a subject of considerable public interest, and it is notable that the proposition was received with very general favour from all sides of the House. Mr. O'Sullivan succeeded in making out a good case for legislative action to effect an improvement in the quality of the whisky supplied to the poorer classes, with the view of mitigating the evils arising from the drinking of new and crude spirits.

It is now well known that a large proportion of the whisky sold at public-houses is comparatively new, and contains fusel-oil in sufficient quantity to produce most injurious effects upon those persons who are in the habit of constantly drinking it, even in moderate quantities. As the result of our own experience, founded upon a limited inquiry instituted in 1877,* and to which Mr. O'Sullivan referred in

* SANITARY RECORD, March 2, 1877.

moving the second reading of his Bill, we can speak from our own knowledge of the prevalence of the impure and unwholesome character of the whisky which is sold at many of the public-houses, especially in low neighbourhoods.

Although the subject is one that should, from its connection with the public health, receive immediate attention, we are afraid that the apparent unanimity which prevailed on the occasion of the second reading of Mr. O'Sullivan's Bill, is not to be accepted as conclusive evidence that the question will be settled this session, and that the further progress of the Bill will be unopposed. In fact, in judging from the notices that have already been put upon the papers of the House, it is obvious that there are considerable difficulties to be encountered in the further progress of the Bill, and we think we are right in assuming that there is but little hope of the Bill becoming law this session.

We are aware the subject is surrounded with some difficulty, and it is not an easy matter to satisfy all interests; but if the Bill is promoted for the good of the public and apart from trade interests, we cannot see why some simple scheme might not be devised by which the compulsory bonding system for one year could be made to apply to all whisky supplied to public-houses, as this is really all that is required. There is no reason for requiring spirits intended for rectifying and compounding purposes to be kept in bond for twelve months, nor, indeed, should such a regulation apply to neutral or highly-rectified spirits intended for the arts and manufactures, and the preparation of medicines. There would be no justification for applying the compulsory bonding system to such spirits, as it could serve no good purpose, while it would tend to unnecessarily increase the price of the spirit, which would act adversely to our commercial interests.

The greatest difficulty, we consider, in carrying out a compulsory bonding system of one year would arise in applying the regulation to foreign and colonial spirits, and we confess we do not see our way to get over this difficulty. In our present commercial relations with continental and other Governments we cannot afford to apply arbitrary rules to the admission of foreign goods into this country, as in many instances the compulsory bonding of foreign and colonial spirits for twelve months would be equivalent to an absolute prohibition of their importation, from the heavy warehousing charges which would be incurred, and yet the spirits may have been upwards of twelve months old before they reached this country.

We also confess we do not see that a compulsory bonding system for one year only would cure all the evils arising from the drinking of new whisky, as it is well known the spirit, as prepared for the market, contains very unequal proportions of fusel oil and other impurities, and in many instances a period of twelve months would effect but a very partial improvement in the quality of the spirit, and we fear that the whole thing would probably end in disappointment to the advocates of the scheme.

On the whole, even if no legislation takes place for the compulsory bonding of spirits for a fixed period, we consider much good will be effected by the discussion of the subject of the presence of fusel oil in whisky, and of its noxious and dangerous character to those who are in the practice of drinking new whisky at public-houses.

We cannot help adding, however, an opinion that much of the evil arising from drinking whisky is due to the quantity taken rather than to the quality of the article, and we by no means agree with Professor Burrell, as quoted by Mr. O'Sullivan, that "alcohol, purified from its fusel oil, is perfectly harmless".

NOTES OF THE MONTH.

THE PROTECTION OF INFANT LIFE.

The case of neglect at a so-called Infants' Home, which has recently been exciting so much painful interest, has occasioned the issue of a circular from the Home Office, suggesting whether it might not be well for mayors or other chief authorities of towns to give instructions to the local police that all advertisements in the local newspapers relating to 'Establishments for Taking in Infants' should be noted by the police; and that in case of suspicion, a copy of the advertisement should be sent to the police authority of the locality in which the establishment appears to be situated. We hardly think this circular will be sufficient to check such nefarious practices as have recently come to light: but it is at least a step in the right direction.

IMPROVEMENTS AT PETERBOROUGH.

We are glad to be able to report that at last Peterborough is supplied with pure water in mains, so that there need be no more recourse to wells, which must inevitably be more or less polluted. The drainage works of the city are also making satisfactory progress.

OPEN SPACES IN THE METROPOLIS.

The last annual report of the Metropolitan Board of Works contains some statistics as to the extension of the 'lungs of London', which it may be interesting to reproduce in these columns. The report states that during last year two additional open spaces were permanently secured to the public—Plumstead Common and Shoulder of Mutton Green. The following open spaces by the action of the Board are open to the public:—Finsbury Park, 115 acres; Southwark Park, 63 acres; Gardens on the Victoria, Albert, and Chelsea Embankments, and in Leicester Square, 14 acres; Blackheath, 267 acres; Hampstead Heath, 240 acres; Shepherd's Bush Common, eight acres; London Fields, 27 acres; Hackney Downs, 50 acres; Well Street Common, 30 acres; North Mill Field, 29 acres; South Mill Field, 28 acres; Clapton Common, 9¼ acres; Stoke Newington Common, 5½ acres;

waste land at Dalston Lane and Grove Street, Hackney, 1 acre; Tooting Beck Common, 144 acres; Tooting Graveney Common, 63 acres; Clapham Common, 220 acres; Bostall Heath, 55 acres; Plumstead common, 110 acres; Shoulder of Mutton Green, 4 acres—total, 1,482¾ acres. There is reason to hope that before long this list may be increased by the addition of the places undermentioned, with respect to which the Board has been for some time in negotiation:—Wormwood Scrubs, 194 acres; Brook Green, 6 acres; Eelbrook Common, 18 acres; Parson's Green, 4 acres;—total, 222 acres. We are gratified, moreover, to observe that through the exertions of the Rev. S. A. Barnett, who is always foremost in movements of this kind, the Vestry of Whitechapel have undertaken the management of the old burial ground in Baker's Row, as an open space and recreation ground. It is intended to asphalt a portion as a playground, which will be clear of trees and all obstruction to play. The rest of the ground will be laid out as paths between borders, in which planes and other hardy trees will be planted. The paths will be asphalted and provided with many seats. The cost of the maintenance of the ground is estimated at about £100 per annum, inclusive of the wages of the man to be in charge.

THE VENTILATION OF CANAL BOAT CABINS.

The indefatigable philanthropist Mr. George Smith has called attention during the last month, after a visit to a number of canal wharfs in various parts of the country, to the manner in which the ventilation of the cabins of canal boats is carried out, or rather to the want of ventilation which is evident in these places. Only a few weeks since, two boatmen were suffocated in a cabin for want of fresh air; and, without doubt, numbers of poor children are put in jeopardy of their lives in a similar way. It is true that the boats are, or should be, registered, but much laxity prevails in this respect, and Mr. Smith is of opinion that one School Board inspector, detailed to make the necessary visits to these canal boats, would do more good towards improving the next generation of boatmen than would any fifty canal boat missionaries. We must confess that here lies an hitherto untrodden field for sanitary invention, and if but one hundredth part of the talent now directed to questionable improvements upon traps or closets were applied in the direction of securing an ampler means of ventilation in our canal boats, the greatest benefit would accrue. Surely some uniform plan could be hit upon, and we will gladly open our pages to communications upon this very necessary subject for sanitary exploitation.

VENTILATION OF THE UNDERGROUND RAILWAY.

Attention has lately been called to the want of proper ventilation in the underground tunnels of the Metropolitan Railway, and it is suggested that a very salutary lesson might be derived by the directors, after an inspection of the Liverpool Lime Street tunnel, of the Mont Cenis Railway tunnel, or of any second-rate colliery. One gentleman, by way of illustration, gives his experience while lately travelling between Edgware Road and King's Cross Stations. He describes the condition of the atmosphere to have been so poisonous that, although a mining engineer, he was almost suffocated; was obliged to be assisted out of the train at an intermediate station, taken to a chemist's shop close by, and be supplied with some restorative. The chemist admitted that he had often twenty similar applications in a day. We called attention to this matter in the SANITARY RECORD of January 23, 1875, and whilst admitting that a due ventilation of the almost continuous tunnel which forms the line is a somewhat difficult problem to solve, still skill and science are able to command the difficulty. We then described the contrivance of Mr. Tomlinson, which was set up in the tunnel of 1,400 yards long, between King's Cross and Gower Street, the air being taken in at King's Cross and escaping at Gower Street. Thin planks, forming a double screen, sloping each way to a central point above, were made use of at that time, and these deflected upwards, through ventilating spaces, the heated air which is driven along the top of the tunnel before every approaching train. It is evident that either this contrivance has fallen into desuetude or that it was insufficient to cope with the evil. It is suggested that the Mines Regulation Act should be put in force on the Metropolitan Railway, and the erection of large fans insisted upon. Something should most certainly be done to cure this much-complained of evil. In the matter of the Mont Cenis tunnel, the average passage through which extends over half an hour, no inconvenience is felt by the passengers, as we have ourselves seen during the past year. In the case of the Metropolitan Railway, however, where the trains are very numerous and pass each other repeatedly, the case is very different, and the problem rendered one of intricacy. Here is another nut in ventilation for our sanitary engineers to provide with a suitable pair of crackers.

DROITWICH NEW WATERWORKS.

Droitwich, the midland city of salt, possessed no public waterworks until the end of June, when those designed by Mr. E. Pritchard, C.E., of Westminster and Warwick, and executed by Mr. W. Law, contractor, of Kidderminster, were publicly opened by the mayor. The town was previously supplied only by shallow private surface wells, the majority of which were brackish, and many were contaminated by sewage. The new supply is obtained from a fresh water drift beneath Newland Common and the Smite hills. There was a small outcrop at Tagwells, where Mr. Pritchard cut three adits, in which he placed perforated pipes covered with gravel. Two of the adits wind round the slope of the hill, and one is driven into the face of it. By these means what was only a trickling spring has been made to yield 120,000 gallons per day, which careful gaugings have shown to be constant. The water is pumped by two engines, driving direct-acting equilibrium pumps, constructed by Messrs. James Taylor and Co., Britannia Works, Birkenhead. Each pump, with 40 lbs. of steam, will raise 10,000 gallons per hour to the reservoir on the Newland hill, 100 feet above the highest point of the town, where there is storage for 127,000 gallons, or about three days' supply. The water is supplied constantly by gravitation through four or five miles of cast iron piping, and waste is checked by one of Kennedy's patent meters. The works have cost £9,000, including £2,500 for land and compensation, and it is computed at one shilling per gallon, allowing all required for sanitary purposes free. The revenue from private consumers will exceed the annual cost, including repayment of capital, interest, and a fair allowance for depreciation. The mayor, before starting the engines, briefly complimented the engineer,

Mr. Pritchard, and also the contractors who had carried out his plans for the works, which he characterised as a triumph of engineering skill and scientific and geological knowledge. Dr. Swete, the medical officer, read an analysis of the water, which he declared showed it to be as pure as, if not purer than, the celebrated St. Anne's Well at Malvern. The engines and pumps having been started by the mayor, the ceremonial terminated.

EARTH CLOSETS.

An inquest has lately been held on three boys, who died at St. Mary's Catholic Orphanage, North Hyde, Heston, in a very sudden and remarkable manner. The evidence showed that the deceased boys were suddenly taken ill with pains in the head and vomiting, and died after a few hours' illness. The local medical men were unable to determine the cause of death, and the coroner accordingly communicated with the Home Secretary, who made an order for two experienced pathologists to make a *post-mortem* examination and analyse the stomachs. Dr. Stevenson, of Guy's Hospital, submitted the contents of the stomachs to a chemical and microscopic examination. He found no vegetable or other irritant poison, and there was nothing to account for the cause of death. Mr. Bond, of Westminster Hospital, made a *post-mortem*, which showed an entirely negative result as to poison having been swallowed by the boys. He was of opinion that the cause of death was blood poisoning from the sewage. He had examined the earth closets, and found them in a very bad condition. The jury returned a verdict of 'Death from poisoning by sewage gas,' adding a rider, that the evil spoken of by Dr. Bond should be remedied. This case is eminently unsatisfactory from every point of view, as earth closets are supposed to give immunity from the generation of sewage gases, and their usual concomitants, typhoid fever, diphtheria, etc. The consensus of evidence goes to prove that such is the fact when ordinary care is exercised in their management. It would seem that there had been great want of attention in not removing the exhausted earth, etc., at North Hyde, and allowing it to remain until it generated gases of so poisonous a character as to cause death in a few hours. Direct administration of a deadly poison could scarcely have had much more rapid and fatal results.

AIR AND ARCHITECTS.

The Members of the Royal Institute of British Architects for years past have had to hold their meetings in a room in which the atmosphere frequently resembled that of most London theatres. This was uncomfortable enough for the members themselves; but when distinguished visitors, who came, perhaps, to hear papers on sanitary improvements, were bathed in perspiration, and nearly asphyxiated, the Council of the Institute naturally felt that sanitation should commence at home; however, as the whole of the Conduit Street premises were not in the occupation of the institute, structural difficulties stood in the way of the desired reform. Arrangements have recently been made with the Architectural Union Company, for acquiring a certain portion of the upper part of the building; and the Council have found it practicable to reconstruct the ceiling of the meeting-room, whereby they say 'not only will light and ventilation be insured, but the artistic character of the room will be improved'. The knowledge how to ventilate public rooms, where the floor space per person is necessarily limited, does not appear to be possessed by the majority of the members of the Architectural profession; nevertheless, we hope, when the above alterations are completed, to see the room full of architects, breathing oxygen in lieu of carbonic acid, and listening attentively to a description of the means employed to introduce the *pure air*, which their Council have 'insured' for them.

'PREVIOUS SEWAGE CONTAMINATION.'

The absurdity of unconditionally condemning water, because it happens to possess oxidized nitrogenous matter in the form of nitrates, is well shown in the last Annual Report of Dr. Armistead to the Saffron Walden Urban Sanitary Authority. As already reported in these columns (vol. viii, p. 87), the Town Council purchased last year the undertaking of the Saffron Walden Waterworks Company, at a cost of £4,000: but, before doing so, it was necessary to ascertain whether or not the water was pure. Dr. Armistead had himself made three or four different analyses, which showed that although the water was very hard, yet it was free from any injurious impurity. A sample sent to Professor Wanklyn showed, on analysis, results almost exactly the same as Dr. Armistead's. The free ammonia was found to be 0.03, the albuminoid ammonia 0.04 parts per million, the chlorine 2.9 grains per gallon, and the hardness 26 degrees on Clark's scale. Professor Wanklyn reported that the water 'is organically very pure, and falls into the first class'. Shortly afterwards, analyses of two samples were made by Dr. Frankland, at the Royal College of Chemistry, who objected to the water because it contained too much 'previous sewage contamination'. Several suggestions, all of which were faithfully carried out, were made by Mr. S. J. Smith, C.E., of the Local Government Board, for preventing any possible sewage contamination. After the lapse of some three months, another sample was sent to Dr. Frankland, who reported—'There is still in it the evidence of a large amount of oxidized soakage from sewers or cesspools: I consider it, therefore, a suspicious water, and I recommend that the analysis be repeated, at least twice a year.' A sample sent to the borough analyst, Mr. J. West Knights, F.C.S. of Cambridge, is reported as 'uncontaminated, and of a high degree of purity: its temporary hardness (owing to carbonate of lime) is rather high, but it is in no way injurious to health. Organic matter, as shown by free and albuminoid ammonia, is very low'. Now, as Dr. Armistead points out, the only evidence reflecting any discredit on the purity of the water is the statement made by Dr. Frankland, that the water contains in it the evidence of a large amount of oxidized soakage, from sewers and cesspools: not recent soakage—there is no evidence of that, even on Dr. Frankland's own showing—but previous soakage. The evidence to which Dr. Frankland refers, is the presence of oxidized nitrogenous matter in the form of nitrates, which may be derived from any animal substance, even from those minute *foraminifera* and other fossil organisms which existed ages ago, and now make up the substance of the chalk itself. To say, then, that because nitrates are evidence of the previous presence of animal matter, they are evidence of previous sewage contamination, is equivalent to saying that there is no animal matter except sewage. The subject need not be pursued further; but we

may add that the Local Government Board do not appear to have regarded Dr. Frankland's adverse comments as condemnatory of the water, since they sanctioned the purchase of the waterworks by the corporation, and authorised them to borrow the money from the Public Works Loan Commissioners. It may be interesting to add that the particular well in question was dug about 25 feet, and properly steined, so as to keep out the surface water. It was then bored 1,004 feet into the chalk, in the hope of reaching the greensand, but without success. The chief spring supplying the well is about 275 feet from the surface, and rises to about 18 or 20 feet from it. The only objection against the water seems to be its hardness, a fault common to all waters derived from the chalk, but one which can easily and inexpensively be got rid of by the Porter-Clark process.

SANITARY INSPECTION OF BETTER CLASS HOUSES.

The need of some such systematic inspection of the houses of the well-to-do, as has been mapped out by the National Heath Society (see vol. ix, p. 38), is well shown by some facts contained in the last Annual Report of the Medical Officer of Health for Croydon. Dr. Philpots observes that in continuance of the systematic inspection of houses of the better class, 1,048 were visited, and their sanitary arrangements examined by the inspectors during the year. Not counting trivial faults, there were found in 551 of these houses defects of one kind or another, such as would allow the escape of air from the sewer or cesspool into the house. In each case a report of the defects was forwarded to the occupier; but seeing that an escape of sewer-air into the house is injurious to health, and therefore a nuisance, and that this nuisance arose from 'the want or defective construction of some structural convenience', a notice to remedy the defect was also sent to the owners of the house. This notice was complied with in 480 cases. Dr. Philpots characterizes the number of good houses found to have defects as astonishing. In more than half the houses visited there was found some open channel through which sewer-air could find its way into the house; *i.e.*, connections which permit an unimpeded flow of sewer-air into the interior of a house. Such a result shows the necessity for systematic house inspection, and its value as a sanitary measure. To this inspection Dr. Philpots rightly attaches great importance—the ill effects to health from defective houses forming a constant experience. Houses of the better class require inspection just as much as the cottages, perhaps more so, as in the latter the sanitary conveniences, which, if defective, are so potent for evil, are very frequently placed out of doors, where defects are comparatively innocuous.

THE DRAINAGE OF REDDITCH.

The long-vexed question of the drainage of Redditch has at last come to a head. The Local Government Board have written to the local Authority, giving them six weeks to decide as to the steps which they will take to provide proper sewerage for the place. On the receipt of this letter the local board published a manifesto to the inhabitants, placing the issue in their hands, and requesting each ratepayer to give his vote for or against the proposed works. If the local board do not receive the requisite authority from their constituents, they propose to resign; but we hardly see how this will mend matters, and there seems to be no alternative open to the local board but to give directions for the execution of the works, which the high death-rate of the district from preventable causes shows to be so urgently necessary.

HEALTH OF WATERING PLACES.

The death-rate of Hastings for the first quarter of this year was 15.33 per 1,000, the deaths from zymotic diseases being very few in number. Nearly a sixth of the deaths were those of visitors. For the same period the death-rate of Scarborough was 21.46 per 1,000, or an increase of nearly three on that for the corresponding period of 1878. Six deaths occurred from zymotic diseases, as against sixteen in the corresponding period of 1878, and the increase in the mortality is mainly, if not entirely, due to the large number of deaths from diseases of the lungs and air passages. At Ilfracombe during the June quarter only twenty-two deaths occurred—a number equal to a yearly death-rate of 16.5 per 1,000. It is noteworthy that only one death has occurred here from zymotic disease during the whole of this year. At Southport the gross death-rate for last month was 15.68, and the local death-rate 13.21 per 1,000. No case of zymotic disease has occurred in the town since February. This diminution in the death-rate must be very gratifying to the Council, who have within the last three years spent £132,000 on works of sewerage; and it speaks volumes for the energy of Dr. Vernon and the other sanitary officials of the town.

TYPHOID FEVER AT HITCHIN.

For some months past the town of Hitchin has been suffering from a severe epidemic of typhoid fever, and a local institution of an admirable kind for supplying trained and efficient nurses in such an emergency as the present has had its capabilities fully taxed by the large number of cases which have occurred. Many of the inhabitants are strongly in favour of applying to the Local Government Board to send down an inspector to investigate the circumstances of the outbreak, but at present this has not been done. The vicar, the Rev. L. Hensley, however, adopted the exceptional course of introducing the subject in his sermon preached on Sunday, July 6th, in which he approved of calling in the aid of the Local Government Board, and strongly urged upon the Local Board as the Sanitary Authority the importance of a thorough examination of the condition of the dwellings of the poor, many of which were quite unfit for habitation, and, from their unsanitary condition, likely to favour the spread of disease. The cause of the epidemic is, in all probability, due to the water-supply, or rather to its distribution. The results of an analysis show that the supply of water at the reservoir is pure, but, unfortunately, it is conveyed to the inhabitants through a broken conduit which may at many points admit poisonous matter. Two years ago, Dr. Frankland was called in, and, as a result of his analysis of the water from wells in various parts of the town some of them were closed; and another polluted well has been discovered in a locality where the disease has been worst. The system of waterworks was designed and carried out by Mr. Rawlinson more than twenty years since, and was adapted to the service of a constant supply. For many years the Local Authority have made the supply an intermittent one, but now it is to be made

constant again; and, in the light of the present painful experience, it is to be hoped that the Local Board will provide an impervious main, and give to the water-supply of the town the attention its importance deserves.

THE LOWER THAMES VALLEY DRAINAGE SCHEME.

At a meeting of the Main Sewerage Board held on the 18th ult., it was resolved, by the casting vote of the Chairman, to apply to the Local Government Board for a provisional order to enable them to dispose of the sewage of the united district upon land near Molesey. The project which the House of Commons so ignominiously rejected on the 21st of March last will, therefore, now come before them in a new shape in the course of next session, and the result will be awaited with immense interest. Meanwhile, the opponents of the Bill are leaving no stone unturned to disconcert the Board. They attended in large numbers at the recent audit of the Board's accounts, and objected to every conceivable and inconceivable item. The audit has not yet been finished, so we have no opportunity as yet of observing the effect of these tactics.

THE PUBLIC HEALTH

IN THE FOUR WEEKS ENDING 28TH JUNE, 1879.

In 23 of the largest cities of the United Kingdom 22,624 births and 12,986 deaths were registered last week, equal to annual rates of 34.8 and 20.0 per 1,000 of the estimated population. The annual death-rate was equal to 20.3 in Edinburgh, 19.6 in Glasgow, and 41.0 in Dublin. The 988 deaths in Dublin included, however, 324 that occurred prior to the beginning of June. Excluding these 324 deaths, the corrected death-rate in Dublin is equal to 27.5 per 1,000. A considerable proportion of the deaths that occurred in Dublin during June will, however, probably be subsequently registered, on the receipt by the local registrars of the returns from the cemetery authorities, furnished under the provisions of the Public Health (Ireland) Act of 1878.

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Four Weeks ending 28th June 1879.				
		Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000. All Causes.	Annual Rate of Mortality per 1,000. 7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns	7,383,999	19,625	10,779	1544	19·0	2·7
19 Provincial Towns	3,763,131	10,166	5,489	676	19·0	2·3
London (Reg. Gen.)	3,620,868	9,459	5,290	868	19·1	3·1
Brighton (borough)	105,608	241	138	11	17·0	1·4
Portsmouth (borough)	131,821	317	129	7	12·8	0·7
Norwich (borough)	85,222	199	127	15	19·4	2·3
Plymouth (borough)	74,303	149	85	6	14·9	1·1
Bristol (city)	209,947	500	263	26	16·3	1·6
Wolverhampton (borough)	75,100	200	110	9	19·1	1·6
Birmingham (borough)	388,884	1,161	536	77	18·0	2·6
Leicester (borough)	125,622	364	160	12	16·6	1·2
Nottingham (borough)	169,396	433	214	18	16·5	1·4
Liverpool (borough)	538,338	1,524	881	107	21·3	2·6
Manchester (city)	361,819	955	631	83	22·8	3·0
Salford (borough)	177,849	498	264	47	19·4	3·4
Oldham (borough)	111,318	284	141	18	16·5	2·1
Bradford (borough)	191,046	454	305	42	20·8	2·9
Leeds (borough)	311,860	861	451	43	18·9	1·8
Sheffield (borough)	297,138	853	408	63	17·9	2·8
Hull (borough)	146,347	446	192	29	17·1	2·6
Sunderland (borough)	114,575	351	181	19	20·6	2·2
Newcastle-upon-Tyne (borough)	146,948	376	273	44	24·2	3·9

In the 20 English towns the births were 19,625, and the deaths 10,779. Both the births and the deaths were below the average monthly numbers during 1878. The deaths showed a further considerable decrease from the numbers returned in recent months, and included 1,544, which were referred to the seven principal zymotic diseases, of which 463 resulted from measles, 357 from scarlet fever, 302 from whooping-cough, and 134 from fever, principally enteric. The 1,544 deaths from these seven zymotic diseases in the 20 towns, during the four weeks of June, were equal to an annual rate of 2.7 per 1,000. This zymotic rate did not exceed 0.7 in Portsmouth, 1.1 in Plymouth, or 1.2 in Leicester. It ranged upwards in the other towns to 3.0 in Manchester, 3.1 in London, 3.4 in Salford, and 3.9 in Newcastle-upon-Tyne. Of the 463 fatal cases of measles no less than 354 were recorded in London, whereas but 109 occurred in the 19 large provincial towns, which have an estimated aggregate population slightly exceeding that of the Metropolis. Scarlet fever was somewhat more fatal in the provincial towns than in London, especially in Newcastle-upon-Tyne; whereas the fatal cases of diphtheria were proportionally more numerous in London. The rate of mortality from fever was exceptionally low in London, the rate in the nineteen provincial towns being 50 per cent. higher than that which prevailed in the Metropolis. Small-pox caused forty-six more deaths in London and its outer ring of suburban districts, whereas not a single death was referred to this disease in any of the nineteen large provincial towns. The immunity from fatal small-pox which these nineteen large towns have recently enjoyed is probably without precedent, as only one fatal case has been recorded therein since the beginning of the year. The number of small-pox patients in the Metropolitan asylum hospitals, which were 199 on the 31st May, remained almost stationary during the month, and were 195 on the 28th June. The number of new cases admitted to these hospitals during the four weeks ending 28th ult. was 166 against 174 in the preceding four weeks. The Highgate Small-pox Hospital contained 19 patients on 28th ult., 22 new cases having been admitted during the preceding four weeks.

Portsmouth, during the four weeks under notice, showed the lowest annual rate of mortality among these twenty towns—12.8 per 1,000. The rates in the other towns, ranged in order from the lowest, were as follow:—Plymouth, 14.9; Bristol, 16.3; Nottingham, 16.5; Oldham, 16.5; Lancaster, 16.6; Brighton, 17.0; Hull, 17.1; Sheffield, 17.9; Birmingham, 18.0; Leeds, 18.9; London, 19.1; Wolverhampton, 19.1; Salford, 19.4; Norwich, 19.4; Sunderland, 20.6; Bradford, 20.8; Liverpool, 21.3; Manchester, 22.8; and the highest rate during the month 24.2 in the borough of Newcastle-upon-Tyne. The death-rates in these towns during June were almost unprecedentedly low. This was probably due, in part, to the high death-rates that have prevailed during the long winter of 1878-9, and partly to the unseasonably low temperature and abundant rains that prevailed during the greater part of the month, and checked the advent of the usual epidemic of infantile summer diarrhœa. Unseasonably cold summers affect the rate of mortality almost as favourably as do unseasonably warm winters. It is worthy

of note that during June, notwithstanding the exceptionally low death-rate from all causes, the fatality of diseases of the respiratory organs exceeded the average in recent corresponding periods in those towns for which the facts are available. It is to be regretted that the Registrar General does not see his way to give weekly information of the fatality from acute diseases of the lungs in each of the twenty large English towns dealt with in his weekly return.

In inner London the death-rate from all causes in the four weeks was equal to 19.1, and from the seven zymotic diseases to 3.1 per 1,000 of the population. In the aggregate of the nineteen large provincial towns their rates were 19.0 and 2.3 per 1,000 respectively. Zymotic fatality showed an excess in London, owing mainly to the epidemic prevalence of measles. In the outer ring of suburban districts around London (having a population estimated at little short of 1,000,000 persons) the death-rate from all causes did not exceed 13.2, and the zymotic rate was but 1.2 per 1,000 during June.

SPECIAL REPORTS.

ENTERIC FEVER AT PENISTONE.

EARLY this year an outbreak of enteric fever occurred at Penistone (a small urban district in Yorkshire of less than 2,000 inhabitants), which became so serious that Dr. Thorne Thorne was sent down on behalf of the Local Government Board to investigate it. Dr. Thorne's report, with a copy of which we have been favoured, reveals the fact that, notwithstanding the systematically high death-rate of the village, for it is little more, and the continued warnings of the Medical Officer of Health, nothing whatever has been done to put the district in a wholesome state. Shocking as this is, it is hardly more than could be expected from an authority which has probably not the smallest conception of its sanitary responsibilities. An immense number of small places in the north, especially in Yorkshire, adopted the Local Government Act when there were no restrictions on its adoption, simply to get the highways under their own control, and for no other purpose. Penistone is doubtless one of these, and the local board has probably yet to learn that it has any duty to perform with regard to a sustained death rate of 21.5 per 1,000.

Dr. Thorne has evidently found it impossible to attempt to assign any particular medium for the spread of the epidemic of enteric fever, since everything in the district favoured its propagation. The water supply for Penistone is reported as admittedly bad, both in point of quantity and quality. Of the three principal public supplies, one appears to be a wholesome water, and no cases of enteric fever in that part of Penistone where it is used could be heard of. The two others are in the main street, down which pass drains which must admit of the soakage of their contents into the surrounding soil. One is a dipping-well, the supply from which passes through manured land, and it is conveyed to the roadside in a glazed pipe drain, which passes within about 10 feet of a midden-privy containing sloppy contents. The other, a deeper well fitted with a pump, is in very near proximity to some square stone drains, and to an open ditch which receives sewage; the springs supplying it are also, in all probability, liable to receive soakage from a large sloppy midden-privy in higher lying ground. In addition to the above supplies, there are (1) one or two springs and certain private wells, which do not appear to be contaminated; (2) a number of wells known to be foul by soakage from midden-privies and leaky drains, but which are resorted to during the summer months; (3) other wells which, although in constant use, are either fouled or liable to be fouled, or which must, from the nature of their surroundings, be looked upon with suspicion. With but few exceptions, however, even these supplies are scanty, and many inhabitants are obliged to resort to a sewage-tainted brook for so-called 'cleaning purposes', if not at times for drinking and cooking purposes.

There is nothing which can be called a system of sewerage and drainage in Penistone. Certain old square stone drains, originally constructed to carry rain-water off the highways, have been converted into sewers, and in some parts of the town glazed pipe drains have been put in. There is, however, no plan of the various drains, and no trustworthy information concerning them could be procured. Up to within the past two months it has been a general custom to have a direct communication between the interior of the drains and the interior of the houses.

There are a few waterclosets in Penistone communicating with the faulty sewers above referred to, but the midden-privy is the usual means for the disposal of excrement and refuse. By far the majority of the midden-privies are so constructed that they must necessarily cause grave nuisance and injury to health. The privy is almost invariably so placed with regard to the midden that no proper mingling of the ashes with the excreta is possible; the middens are sunk below the level of the surface, and so facilitate the soakage of surface-water into them; they are, as a rule, uncovered, and the privy roofs drain towards them, so that they receive a large amount of rainfall —in some instances between 2,000 and 3,000 gallons per annum—and thus decomposition of their contents and saturation of the surrounding soil are inevitable. The capacity of the middens is also such as to favour the accumulation of large quantities of excrement and refuse in the immediate vicinity of the dwellings. Nearly throughout Penistone the midden-privies are a source of the greatest nuisance, and they are often so placed that the dwellings are surrounded by an atmosphere and by a soil which is thoroughly fouled. In short, the town privies only needed to be infected by the introduction of a case of enteric fever to give the readiest opportunity for the disease to spread, both directly, from the privies, and indirectly, by the agency of water derived from the soil in which the privies are sunk. There are only two slaughter-houses in Penistone. Within about 3 feet of the door of one, in which meat was hanging, was found a huge open dung and refuse pit, capable of holding about 500 cubic feet of refuse. The sanitary authority possess no means of isolation for persons sick of infectious disease who cannot be duly isolated in their own houses, and the only means of disinfection available are the imperfect measures which, in the absence of the provision of some public disinfecting chamber, can be carried out on the premises of persons in whose houses infectious disease appears.

The work of the Inspector of Nuisances, who receives a salary of £7 a year, is evidently badly performed. Notwithstanding the almost universal prevalence of nuisances, the total number reported in the years 1875-78, during which he has held office, was twenty-one, some of the reports relating to conditions precisely resembling those still ex-

isting in the same localities. In 1877 one single nuisance was reported. There is also a Town Surveyor, whose duties relate to 'the execution of surveys, engineering works . . . repairing of highways, etc. . . . advising the board as to . . . new streets . . . to alterations or amendments' as to drains, cesspools, privies, etc., and to many other important matters, involving skilled services, such as the superintendence of works of drainage, etc., during which precautions are to be taken by him to prevent the occurrence of conditions 'prejudicial to health'. 'This officer,' says Dr. Thorne, with a sort of grim sarcasm, 'receives six shillings a week.'

Plans of all new houses appear to be regularly inspected by the authority, and under the bye-laws no privy, ashpit, or cesspool can be erected unless in point of construction they meet with the approval of the authority. But notwithstanding this, some of the cesspools and many of the midden privies, which cause the greatest amount of nuisance and are so obviously a source of injury to health, are of comparatively recent construction. The worst of the huge, sloppy, and stinking midden-privies, which have been built almost immediately under bedroom windows, are to be found at the houses which have been erected since the bye-laws came into operation, and one house, which was only built 'about twelve months ago', was found to be in actual contact with an unroofed midden-privy, the liquid contents of which were evidently saturating the side wall and foundations.

With a knowledge of these facts, it is not surprising that enteric fever, having once been imported into the town, should spread so widely that during the present year forty-two non-fatal cases and five deaths should have occurred from that disease, besides fifty to sixty cases of scarlet fever (with ten deaths) in the same period. Evidently the proper thing to do is to abolish these tiny local boards, and form such a federation of them that works of drainage and water supply can be proceeded with on some reasonable sort of system.

THE COMPULSORY NOTIFICATION OF INFECTIOUS DISEASE AT BOLTON.

IN his last annual report on the sanitary condition of Bolton, Mr. Sergeant, the Medical Officer of Health, gives some very interesting statistics as to the working in that borough of the clause in the local Act of 1877, providing for the notification to the sanitary authority of cases of infectious disease. He says that the compulsory notification of infectious disease has, in his opinion, largely contributed towards diminishing the number of deaths from fever and small-pox, which, being preventible diseases, are perceptibly influenced by sanitary measures, if information be obtained sufficiently early. The general zymotic rate for the year 1878 has not been markedly affected by this provision, although he believes, when it has settled down into thorough working order, he will soon be able to note a satisfactory decline. The compulsory provision has now been in operation a year, and from the table below it is obvious that, although not all the infectious disease was reported, yet a very large proportion has been, and sufficient, perhaps, to satisfy one of its ultimate benefit.

The information received of infectious disease has, no doubt, been of practical value in bringing to light unhealthy conditions in houses which might otherwise have existed until further disease, or possibly death, had taken place. In many cases the authorities have been enabled to limit the spread of disease by careful

Quarters.	Deaths.									Total Deaths from Infectious Disease.
	Small-Pox.	Measles.	Scarlet Fever.	Diphtheria.	Typhus Fever.	Typhoid Fever.	Continued Fever.	Puerperal Fever.	Cholera.	
First Quarter.....	..	2	49	..	..	4	2	1	..	58
Second Quarter.....	..	9	40	2	..	11	4	..	..	66
Third Quarter	..	15	33	..	1	5	..	1	..	55
Fourth Quarter	..	16	22	..	2	9	1	..	4	54
Year	..	42	144	2	3	29	7	2	4	233

Quarters.	Infectious Cases.									Total Number of Infectious Cases.
	Small-Pox.	Measles.	Scarlet Fever.	Diphtheria.	Typhus Fever.	Typhoid Fever.	Continued Fever.	Puerperal Fever.	Cholera.	
First Quarter.....	1	61	531	3	6	40	39	2	..	683
Second Quarter.....	..	172	247	5	6	24	37	..	..	491
Third Quarter	..	208	178	4	4	18	17	2	..	431
Fourth Quarter.....	1	125	137	5	11	47	4	..	4	334
Year	2	566	1093	17	27	129	97	4	4	1939

attention to cleansing and disinfection of the house and clothing, and by the means taken to insure isolation of the infected patient as far as possible. The knowledge has also been beneficially used in keeping children likely to spread infection from attending school, and so assisted in eliminating a danger which ought not to exist.

SANITARY INSTITUTE OF GREAT BRITAIN.

THE annual meeting of the members of this institute was held on the 10th inst, at the Royal Institution, Albemarle Street, for the purpose of presenting the prize medals and certificates of merit awarded to the successful exhibitors at the Stafford Exhibition, and of hearing an address on 'Water Economy', by Mr. G. J. Symons, F.R.S. The Duke of Northumberland, who presided, said this was the second occasion on which the society had given prizes, and though it had been in existence but a short time, it was evidently doing much good. His Grace then proceeded to present the medals. The Richardsonian gold medal for the best invention exhibited had been awarded to Mr. Griffiths, of the Silicate Paint Company, for 'patent white', a non-poisonous substitute for white lead, and his Grace in presenting it said he understood this was the best invention that had ever been produced for the alleviation of the suffering caused by lead paints. The bronze medals (of which there were twelve) were for silicate paint, enamel paint, and petrifying liquid for damp walls (also awarded to the Silicate Paint Company), for invalid tubular water and air beds, for apparatus for cooking by gas, for joints for stonework pipes, for economic hollow flooring, for a portable cinder-sifting ash pit, for Moule's patent earth closets, for portable ranges, and several other appliances. The medals and certificates having been presented, his Grace vacated the chair, which was taken by Dr. Richardson, and Mr. Symons then proceeded to read his paper, the object of which was to shew that inasmuch as the quantity of rain falling cannot be increased, and as the population is rapidly increasing, it is becoming

imperatively necessary that the water supply should be placed under the direction of a Government department, so that it may be utilised for the whole nation, and that the wealthy towns should not be allowed to appropriate large sources of supply for their own individual and separate benefit, as Manchester had done by taking Thirlmere. A short discussion followed, in which Mr. Edwin Chadwick, C.B., Mr. Palmer, M.P., and Dr. Antonio Brady joined, and in which a general concurrence in the views of Mr. Symons was expressed, the chairman and Mr. Palmer pointing out that in Committees on private Bills the parties before them only were represented, and that there ought to be some one to represent the public. A vote of thanks was given to Mr. Symons for his paper. The annual dinner took place at the Grosvenor Restaurant in the evening, Dr. Richardson in the chair, and at which Earl Fortescue, Professor Yandell, and M. Joly were among the speakers. The chairman, in proposing the toast of the evening, said it was in contemplation to found a technical school, and have examinations in sanitary science.

THE PARKES MUSEUM OF HYGIENE.

THIS collection, founded as a memorial of the late Dr. E. A. Parkes to promote the study of all matters bearing upon the health of the community or the individual, was formally opened on the 28th ult. by the Home Secretary. At present, there have been brought together in the museum, apparatus, specimens, books, reports, and drawings illustrative of matters connected with engineering and local hygiene; architecture, including general designs and details of buildings, methods of constructing hospitals, blocks of artisans' dwellings, etc., with specimens of appliances for necessary sanitary arrangements, drainage, ventilation, and lighting; the furnishing of buildings, public and domestic, clothing, food, and the preservation of health and the relief of sickness. Mr. Cross said he was present at the opening to testify his hearty agreement with the founders of this museum in all the objects they had in view. The object of this institution was to bring to bear upon the practical work of life the scientific knowledge which many possessed. Looking at the disease and misery around them, they knew that much of this was preventable, and arose from preventable causes, and what they wanted to do was to hunt disease down into a corner and to stamp it out. In short, they wanted to restore that which was the actual birthright of every citizen—pure light, pure air, and pure water. In conclusion, he declared the museum open. The Duke of Northumberland moved: 'That the Parkes Museum, as fulfilling an educational want which has been long felt, is well worthy of public support.' Mr. G. Godwin in seconding the resolution, expressed a hope that the Government would find a suitable building for the museum, and aid in the establishment of lectures on sanitary science. Lord Cranbrook moved a vote of thanks to the Council of University College for the assistance they had rendered in the development of the Parkes Museum. Sir W. Jenner attributed the dreadful condition in which he found many houses of wealthy people either to the owners' want of faith in sanitary science, or to the ignorance of those who were employed to carry out sanitary works. Professor Huxley expressed a hope that Mr. Cross would use his influence with the Government and with the House of Commons to stay a movement adverse to the development of school-board teaching, which appeared intended to dam back the stream of education and prevent the lower classes from gaining the knowledge they so much needed.

We sincerely agree in the hope that a suitable and convenient home will soon be found for this collection. We are certain that its present almost inaccessible position will prevent many persons from availing themselves of the advantages a practical study of the sanitary appliances, the very useful, though incomplete collection of sanitary literature, and the illustrations of existing sanitary evils there to be found, would confer on them. Seeing is believing, we are told, and there is no doubt that ocular evidence of imperfectly realised facts, such as we find in Mr. Teale's book and in this museum, bring home to us the defects and merits of existing systems of sanitation more forcibly than any amount of unillustrated description, whether verbal or printed.

EARL SHAFTESBURY ON HOMES FOR THE LABOURING CLASSES.

THE thirty-fifth annual meeting of the Society for Improving the Condition of the Labouring Classes was held on the 25th ult. at Willis's Rooms, St. James's, the Right Hon. the Earl of Shaftesbury, K.G., occupying the chair.

The Secretary read the annual report for 1878-9, giving details of the occupation of dwellings, the use of public washhouses, etc. The receipts from all sources during the year were £7,181 11s. 6d., which, with a balance in hand at the beginning of the year of £467 19s. 8½d., made a total of £7,649 11s. 2d½. The total expenditure amounted to £7,173 16s. 7½d., leaving a cash balance of £475 14s. 7d. The property belonging to the society was estimated as worth £34,206 6s. 10d., and the general liabilities amounted to £19,937 4s. 10d., leaving assets to the amount of £14,268 2s.

The Chairman remarked that the question of the improvement of the condition of the labouring classes lay at the very root of our social and material progress. He was happy to say that the improvement of the condition of the working classes in their domiciles was a matter of common-place—everybody admitted it, although he did not mean to say that everybody did all they could to improve it. They had found that the people themselves desired to have improved dwellings, and that if they were offered at a small figure they would find plenty of applicants. But they had to consider another class, which as yet had been beyond their reach. They had been able to do something for married people having a certain income, and the skilled artizan with from sixteen to twenty shillings per week. What they had to consider was a very large class indeed of the ordinary labourers, who could not afford to pay more than one shilling or one and sixpence per week for the accommodation they required. This might do well enough for a single man, but it was quite impossible for a married man to get a place for his family to live in, consistent with the requirements of decency and health. Until they could devise some means whereby they could bring the houses occupied by the poor within this limit as to rent, they would have a large seething multitude full of immorality and ill-health amongst the population of this great city. As to the clearances which had been effected in London, and which caused them to say of some improved localities, 'how beautiful!' they did not

consider that all this had been gained by the sufferings and discomfort of hundreds and thousands of the working people. No doubt to a certain extent these clearances must do a great deal of good to the inhabitants of large towns, opening channels of fresh air in closely confined localities. This had been done by the clearance which was going on by the Metropolitan Board of Works. But look at the misery caused to hundreds of thousands of persons who were turned out to make way for this improvement. They could not go far. The consequence was that houses already overcrowded were overcrowded to suffocation, and that families lived under circumstances terrible to contemplate. The Chairman instanced the locality of Pye Street, Westminster, where the clearance was going on, as being worse than it was before the operations began. The Metropolitan Board of Works had proceeded on a principle the very reverse of that which was pursued in Glasgow. There they displaced tens of thousands of people, but they went on a very judicious and kind principle. They would not displace more than 500 people at a time, and even then, not until it had been ascertained that there was sufficient lodging for the people at a convenient distance from the spot they were removed from. The noble Earl then contrasted the state of the houses of the English peasantry now with that which rendered them notorious twenty-five years ago, and remarked, that in all the cottages belonging to the principal landowners, the improvement was so great that a visitor who had seen these cottages a quarter of a century ago would not now recognise them as being the homes of the same class and people. So long as they left the domiciliary condition of the people unnoticed, so long would the efforts of the School Board be thrown away. A child unlearnt in one hour, in the midst of a filthy, overcrowded tenement, all it had learned of order the preceding five hours at school. This had now become a received opinion; and all that was necessary was that the people should make great efforts to introduce that improvement which was absolutely necessary for the vitality of the country. The workman must be kept near to his work. They could not drive him away from the point where he had formed all his connections. What he had wished was that a great effort should be made to improve the condition of the houses they now live in, by improving the drains, putting them in repair, etc. For £1,000 they could do in this way what it would take £9,000 or £10,000 to do if they went and built the houses from the foundation. This had been done to the houses belonging to the society, and had answered the purpose most satisfactorily.

The Ruthin Board of Guardians have decided to appoint a medical officer for the district at £50 per annum. Hitherto three officers have done the work, and it is owing to these officers declining to accept £45 a-year for their united services that has prompted the board to adopt this new arrangement.

At a recent meeting of the Preston Town Council, it was stated that the excess of the female over the male population was 18 per cent.; between the ages of 20 and 44 it was 28 per cent. It was also said that Preston had almost the heaviest death-rate in the kingdom; the rate was over 30 per thousand, and was excessive among the females between 20 and 50, chiefly employed in cotton mills. It was resolved that the Sanitary Committee should investigate the matter.

COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN JUNE 1879.

The following are the Returns of the Society of Medical Officers of Health:—

Names of Water Companies.	Total solid matter per gallon.	Oxygen required by organic matter, etc.	Nitrogen.	Ammonia.		Hardness (Clark's Scale).	
			As nitrates, etc.	Saline.	Organic.	Before boiling.	After boiling.
	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Thames Water Companies:							
Grand Junction	21·00	0·165	0·129	0	0·012	13·2	4·2
West Middlesex	20·30	0·037	0·135	0	0·012	12·6	3·7
Southwark & Vauxhall	19·11	0·129	0·102	0	0·012	12·1	3·3
Chelsea	19·80	0·033	0·120	0	0·012	12·0	3·3
Lambeth	20·20	0·070	0·120	0	0·012	12·6	5·1
Other Companies:							
Kent	28·10	0·002	0·450	0	0·003	17·6	8·1
New River	20·60	0·059	0·120	0	0·006	13·2	3·7
East London	21·00	0·048	0·150	0	0·011	13·2	4·2

NOTE.—The amount of oxygen required to oxidize the organic matter, nitrates, etc., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid, namely—in that of the Grand Junction Company.

C. MEYMOTT TIDY, M.B.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF LORDS.

(*June* 30.)

THE VILLAGE OF LEIGHTON.

THE Earl of Sandwich read a letter from the Chairman of the Board of Guardians describing the imperfect sanitary condition of the village of Leighton, in the county of Hants, and the injurious effects of overcrowding in the cottages of the poor; and he contended that the Ecclesiastical Commissioners, on whose property the village was situated, ought to take immediate steps to remedy the state of things of which he complained.

Earl Stanhope, on behalf of the Church Commissioners, said that when the village was bought by them it had a population of 450 persons, and contained forty-five cottages and twenty-two poor cottages. Their object had been from the first to improve the condition of the village, and with that object nine of the worst cottages had been pulled down, while the others were being gradually rebuilt in such a manner as to compare favourably with the new cottages on other estates. In the course of last summer certain complaints were made by the rural sanitary authority, and the defects pointed out had been speedily and satisfactorily remedied, and at a very trifling cost.

HOUSE OF COMMONS.

(*June* 30.)

INFANT MORTALITY.

Mr. A. Mills asked the Secretary of State for the Home Department whether he had received a me-

morial from the Guardians of the Poor in the city of Exeter, calling his attention to the increase of infant mortality there; and whether it would be possible to amend the Infant Life Protection Act, 1872, and the Registration Act, 1874, so as to bring foster mothers who had charge of one infant only, and all persons who may procure the burial of still-born children without obtaining a medical certificate, within the provisions of these statutes?

Mr. Cross said that the memorial had been received, and he had consulted the Local Government Board on the subject. He was told that, in their opinion, neither of the suggestions of the guardians was practicable. Each of those suggestions had been considered, and rejected, at the time when the Bills relating to them respectively were passing through Parliament. He might, however, add that he had issued a circular to the different local authorities and members of the police force requesting that the provisions of the Act for the protection of infant life should be properly put in force.

(*July* 3.)

DWELLINGS IMPROVEMENT ACT, 1875.

In answer to Colonel Beresford, Mr. Cross said that the cost of the schemes promoted by the Metropolitan Board of Works under the Artizans' and Labourers' Dwellings Act, 1875, would be found in a paper already on the table. As to the number of persons removed he had not accurate information; but whatever had been done was done gradually, and as his consent must be first obtained for any large number of removals, no unnecessary hardship had been inflicted. As to the sums for which the Board contemplated selling the land, they could not expect to get for the sale of the land as large an amount as they had to pay for the land when covered with houses, and when the different interests had to be bought out. There was at present before the Board a proposition for the purchase of sites by a body able and willing to cover them with houses in a few years, and, although there might be some apparent loss, all the power that he had would be used to induce the Board to accept the proposal.

MAIN DRAINAGE OF THE METROPOLIS.

Mr. Cross, in reply to Sir A. Lusk, said that complaints had been made of overflows of sewage matter into the houses of many inhabitants of Holloway and other parts of the metropolis during the heavy rainfalls last year. The injury complained of was principally caused by the great amount of storm-water, which flushed the sewers and made them flow back into the houses. In some cases, he believed, the houses were not built on the proper levels. He was now in communication with the Metropolitan Board of Works with a view to remedy the evil.

REPORTS OF MEDICAL OFFICERS OF HEALTH FOR COMBINED DISTRICTS.

HALIFAX COMBINATION.—The combination served by Dr. Britton may fairly be regarded as a model one, except that three urban districts, wholly included within its area, have been allowed to provide for themselves. The district includes the whole of the Halifax Poor Law Union, except the borough of Halifax, and the West Vale and Oxenden local board districts. The acreage is 40,859; the population 88,565. For Dr. Britton's services he is paid the salary of £700, which includes all expenses, except stationery and chemicals. The latter must amount to a considerable sum, since Dr. Britton seems to be extremely energetic in making water analyses. It is greatly to be deplored that some sort of general instructions are not issued by the Local Government Board, with regard to the manner in which reports of medical officers of health of combined districts are to be made. In the absence of any such help, the officers are obliged to make the reports according to their own lights: and, as a consequence, no two of them agree in form. We believe it is in accordance with the direct instructions of the Whitehall authorities, that a separate isolated account of sanitary action, in each particular sanitary district, is given in the reports. This is quite right in itself; but the consequence has been, that in the majority of cases, 'combined' medical officers of health have written no general report at all, and have contented themselves with addressing their remarks to the particular authority whom they may happen immediately to concern. There are a few brilliant exceptions to this; but the importance of considering the district as a whole, and of examining periodically the gain to the public health which has accrued through the construction of structural works of improvement, the repression of nuisances, and the general exercise of the functions of health officers, does not seem to be adequately appreciated. We would point out, therefore, to 'combined' medical officers of health, how useful and how permanently valuable it would be if their reports contained more information than they generally do with regard to the progress of their districts as a whole; and we hope the hint we have thrown out will bear some fruit next year.

These remarks do not apply more to Dr. Britton's Report than to those of other officers similarly circumstanced; but we have been struck, on reading his report, with the very meagre details as to the sanitary conditions prevailing, and the improvements effected in the district *as a whole*, and with the total absence of any comparison of the figures for 1878 with those of former years. The truest index of sanitary progress is the saving of deaths from preventable causes: and as to this we should be, if we had not Dr. Britton's former reports to consult, absolutely in the dark. This is a matter to which the attention of medical officers of health generally might profitably be directed, and we hope that before long some general sort of system will be in force, by means of which it will be possible to compare districts much more satisfactorily than can be done at present. It is only fair to Dr. Britton to say that the details of sanitary improvements effected and required are very copious: but it is hardly of so much importance to learn that Mrs. A.'s slops are allowed to drain away as they like, or that Mr. B.'s well is polluted by privy soakage, as to know how districts are generally circumstanced as regards water supply, drainage, excrement disposal, etc.

With these exceptions, we have no fault to find with the report, which is very full and practical. The districts to which it refers are the Halifax Rural, and the Barkisland, Brighouse, Elland, Hipperholme, Luddenden Foot, Midgley, Northowram, Queensbury, Rastrick, Rishworth, Shelf, Southowram, Sowerby, Sowerby Bridge, Soyland, and Warley, urban districts. Of all these districts the highest death-rate was at Shelf (24·4 per 1000); the lowest at Hipperholme (12 per 1000). Life was worth only 18½ years' purchase at Rishworth, against 38·8 years at Northowram. In the whole district, a total of 1,717 deaths

occurred, 292 of which were from zymotic diseases. Scarlatina was the most prevalent zymotic complaint, and it was chiefly fatal at Elland and Rastrick. At the latter place it was more or less prevalent during the whole of the year. Dr. Britton states that the very foolish habit of funeral teas was a fruitful source of infection, and he cites one instance in particular, out of scores of similar cases in the district. In this case the corpse was in one corner of a small room, two children suffering from scarlatina lying in a bed in the opposite corner. In the centre of the room sat several friends and neighbours (two being from adjoining towns), whose chairs were touching either the coffin on one side, or the bed clothes on the other. Speaking of the prevalence of measles and whooping-cough in the same district, Dr. Britton throws out an interesting speculation as to the identity of the infective material producing scarlatina, measles, and whooping-cough, which he has reason to think are diseases of a common origin, the character of the disease being determined by the stages in which the infective material may be when absorbed into the system. He says that he always finds the diseases associated together in some way, and in every instance following each other in regular succession. At Brighouse, Rishworth, Sowerby, Soyland, and Warley, the deaths amongst children under five years of age constituted more than half the total mortality. There is nothing that appears to call for comment in the reports for the separate districts, except that insanitary conditions appear often to remain undiscovered or unnoticed, until they become associated with the outbreak of disease.

WEST KENT.—The fifth annual report of Dr. Baylis, on the health of this combined district, is prefaced by an interesting statement giving its description and character. It consists of the Bromley, Sevenoaks, Tunbridge, Cranbrook, Tenterden, Maidstone, and Malling rural districts, together with the urban districts of Bromley, Beckenham, Sevenoaks, Tunbridge, and Tenterden. Enclosed wholly or partially within the area described, but not included in the combination (the authorities having refused to join), are the urban districts of Maidstone, Wrotham, Southborough, and Tunbridge Wells. The district lies on different geological formations, and is chiefly agricultural. Breweries, paper manufactories, cement, pottery, and brick works are, however, briskly carried on, the latter three especially, in the Malling Union. The total area comprises 311,556 acres, or 486 square miles, which, at the census of 1871, contained 27,178 houses, and 140,174 inhabitants. The estimated population is now 154,060. Dr. Baylis has a salary of £800, out of which he has to pay his expenses; and he is assisted by ten inspectors of nuisances. The district is extremely well managed, promptitude and efficiency being observable on almost every page of the report. Dr. Baylis seems, moreover, to be on excellent terms with his authorities, and to be successful in getting them to adopt sanitary improvements. If he had only given a retrospect of the works which have been accomplished since his connection with the district, the report would have been quite complete. We learn, however, of the approaching completion of the West Kent Main Sewerage scheme, of the decision as to main drainage for the Darenth Valley, and of the provision of drainage for several separate villages. It is to be regretted that in only one district is a hospital for infectious diseases provided. Considering the proximity of much of the district to London, and its constant liability to importations of infectious cases, this is hardly satisfactory, and we would suggest whether combinations for the purpose could not be arranged.

During 1878, the total number of deaths in the district was 2,599, being seven more than the average of the previous four years, and 125 more than the actual number for 1877. The death-rate was 16·8, as compared with 16·2 in 1877, and 16·6 in 1876. About 34 per cent. of the deaths occurred in children under five years of age. Of the several districts, Cranbrook rural had the lowest rate (14·5), and Tunbridge rural the highest (18·8). Zymotic diseases caused 376 deaths, or 2·4 per 1000, as against the average for five years of 2·6 per annum. Of these deaths 23 were from small-pox, of which no less than 27 outbreaks occurred in different places. They were nearly all nipped in the bud; but one, which was not reported attained serious dimensions, ultimately attacking 69 persons, and causing 13 deaths. The deaths from the other zymotics possess no marked features. Fever deaths were equal to the average; whooping-cough deaths were rather above it; but measles, scarlatina, and diphtheria, taken together, show a decrease of no less than one-half. The reports on the different districts show that the ordinary sanitary requirements of the different places are duly attended to.

DONCASTER, ETC.—This district, which has been held until lately by Mr. W. Dyson Wood, now appointed Medical Officer of Health for Oxfordshire in the place of Dr. Gilbert Child, is strictly hardly a combined district, as the areas comprised in it have not been amalgamated by order of the Local Government Board. But it is, to all intents and purposes, a combined district, and as the Medical Officer of Health has received in the aggregate a salary of £500 a year, it may fairly be assumed that a great part, if not all, of his time has been devoted to sanitary duties. As to the district, as a whole, we have no information, except that it has an area of 136,490 acres, and a population of 70,089 (excluding Hemsworth rural district, with an area of 34,831, and a population of 8,114, only recently added). We give below such particulars as can be gathered from the reports of the several districts for 1878, as to the sanitary conditions of the district, and the progress being made therein. *Altofts.*—The death statistics of this place for 1878 are very remarkable, no less than two-thirds of the deaths occurring in children under five years. The general death-rate (26.8) was exactly double that for 1877, there being ninety-four deaths, as against forty-seven in 1877. The diseases mainly responsible for this excess were whooping-cough and bronchitis, which together caused thirty-eight deaths. Three-fourths of these deaths occurred in January and February, when the two diseases were prevalent throughout the entire village. A fresh general supply of water seems to be much wanted, and it is satisfactory to learn that this need is being supplied. Improvement is also required in the construction of privies and ashpits. *Doncaster Rural.*—Much sanitary work, especially as regards sewerage, was accomplished in this district last year. Several public pumps were also repaired, but many of the villages are urgently in want of a better water supply. The death-rate (19.5 per 1,000) was high for a rural district, and is largely increased by the high infantile mortality. There were 122 deaths in children under one year, and 183 among children under five years out of a total of 444, or more than 40 per cent. Eight deaths occurred from typhoid fever, associated as usual with bad drainage and polluted water. Scarlatina caused

seven deaths and whooping cough twelve, five of which occurred at Conisbro', where something like one hundred cases were reported. *Doncaster Urban.*—An improved water supply and improved drainage arrangements are being provided for the town, so that it is to be hoped next year will show a better result than that for 1878, when the death-rate for Doncaster was 24.8 per 1,000. For some reason the general death-rate, as well as that of infants, is systematically very high at Doncaster. Last year 158 of the 519 deaths were in children under one year, and 72 more occurred between the ages of one and five. Mr. Wood does not seem to have fathomed the causes of this exceptional mortality, which certainly deserves particular inquiry. Of the zymotic diseases scarlatina caused twenty-one deaths and typhoid fever fifteen deaths, although only about half of the deaths from the latter cause are stated to be deaths from specific typhoid. Evidently much has to be done at Doncaster before it can properly be considered a healthy town. *Wakefield Rural.*—In this district also there was a large increase in the death-rate as compared with 1877, 858 deaths occurring, as against 746 in 1877. The corrected rate was 21.2 per 1,000, which it is unnecessary to say is for a rural district much too high. The increase in the deaths is mainly accounted for by the number of deaths amongst children under five years of age, who died to the number of 392. Of children under one year of age 236 died—a rate which seems to be representative of the large infantile mortality which is general in the manufacturing districts of the North of England. Small-pox caused three deaths, measles eleven, scarlet fever fourteen, and whooping-cough, which seems the most serious zymotic disease in this locality, forty deaths. Typhoid fever caused fifteen deaths—a number by far too large. We hear, however, of the want of good drinking water, and the urgent necessity of drainage in some parts of the district, and it is to be hoped that the authority will take to heart the lesson which this serious prevalence of a perfectly preventable disease should teach them.

LAW REPORTS.

(*Sittings in Banco, before the* LORD CHIEF BARON *and* Mr. JUSTICE STEPHEN.

THE MALTON URBAN SANITARY AUTHORITY *v.* THE MALTON FARMERS' MANURE COMPANY.

This was an appeal from the decision of magistrates sitting in petty sessions at Norton, in Yorkshire, dismissing the information laid by the appellants against the company under sec. 114 of the Public Health Act, 1875, 38 and 39 Vic., cap. 55. It appeared from the case that the respondents carried on the business of bone-boiling in sulphuric acid within 200 yards of the Malton Station, on the North-Eastern Railway; that effluvia arising therefrom caused nausea and other symptoms, and that though the evidence did not go the length of saying that the general health of the district had suffered, yet sick people, if they breathed it, would suffer, though not permanently. The questions for the court were, was it necessary that the appellants should prove that the nuisance was injurious to health, and, secondly, had they done so by the evidence summarised as above?

Mr. Herschell, Q.C., who appeared for the appellants, said the case came clearly within the Act, as the words ran, 'a nuisance or injurious to the health of any of the inhabitants of the district'. Now this was undoubtedly an offensive trade, intended to be reached by the preceding section. If sick people suffered by reason of this effluvia, could it be contended that the manufacture was not injurious to the health of some of the inhabitants? He cited the case of 'Passey *v.* the Oxford Local Board', reported in *The Times* (Queen's Bench report) of May 8. Mr. Cave, Q.C., for the respondents, while admitting the premises in question might be a nuisance at Common Law, and the subject of an indictment, suggested that they did not come within the meaning of this Act. He relied on the 'Great Western Railway Company *v.* Bishop' ('L. R.' 7, Q.B.), decided in 1872 by the Lord Chief Justice and Justices Lush and Hannen in the Queen's Bench, where a dripping through a railway bridge of water was held not to be a nuisance injurious to health under the prior Health Act of 1855. This Act therefore must be limited in some such sense to a nuisance directly affecting the general health of sound persons. Now the evidence here was that only sick and over-sensitive people were affected, and they not permanently or seriously. Many things affected sick persons that were not within this Act, as the ringing of bells, the loud noise of street traffic, playing a piano next door, etc. The court, however, allowed the appeal with costs, holding the nuisance was within the Act, and that, though it was unnecessary for the appellants to prove that the works were injurious to health, yet they had sufficiently done so by showing that the sick suffered from them. At Mr. Cave's suggestion the case was remitted to the magistrates, as the respondents had not yet been heard.

BRIEF NOTES OF USEFUL CASES.

RATES (NON-PAYMENT OF).

1859. *Phillips* v. *Naylor.*—Action against overseers for maliciously causing plaintiff to be arrested for non-payment of Poor Rate, he being a bankrupt. Judgment for defendants, there being no reasonable cause for the arrest, and no evidence of malice. (28 L.J., Ex., 225; 4 H. & N., 565; 33 L.T. (O.S.) 167; 22 J.P., 355.)

RATES (DUTY OF JUSTICES AS TO).

1840. *Reg.* v. *Yarborough (E. of).*—Since the 6 & 7 Will. IV, c. 96, the duty of Justices in allowing Poor Rates is not judicial or discretionary, but ministerial only. (9 L.J., M.C., 62; 12 A. & E., 416; 3 P. & D., 491.)

TIME FOR ACTION.

1878. *Kay* v. *Atherton L. B.*—Local Board acting as surveyors of highways—Accident to plaintiff through negligent deposit of stones in a road.—The limit of time within which a plaintiff must bring his Action against a Local Board is not the three months prescribed by the 'Highway Act 1835', sect. 109, but the six months prescribed by the 'Public Health Act 1875', sect. 264. (42 J.P., 792.)

OBSTRUCTED HIGHWAY.

1851. *Campbell* v. *Race.*—Way blocked by snow.—A traveller on a highway rendered impassable by a sudden and recent obstruction may pass over adjoining fields so far as is necessary to avoid the

obstruction, doing no unnecessary damage, without being guilty of a trespass. (7 Cushing (N.S.) R., 408.)

BUILDING PLANS.

1878. *Masters* v. *Pontypool L. B. H.*—'Public Health Act, 1875', sects. 158 and 176.—House partly pulled down for rebuilding.—Attempt by Board to acquire part of site compulsorily.—Refusal to sell.—Action to restrain Board from interfering.—Judgment for plaintiff on the ground that the Board had acquiesced in the rebuilding and took, too late, objections as to plans which might have been good if taken in time. (47 L. J., Ch., 797; L.R., 9 Ch. D., 677.)

MARKET.

1878. *Lax* v. *Darlington Corporation.*—Plaintiff a stall-holder in Corporation Market.—Iron railing there dangerous to restive cattle.—Accident to cow.—Judgment for the plaintiff, on the ground that a market is a public place which must be kept in a reasonably safe condition. (48 L.J., Q.B., 143; 40 L.T., 64; 43 J.P., 254.)

MEETINGS.

1879. *Horbury Bridge Coal Company in re.*—Appointment of officer by show of hands. Two persons on one side, three on the other.—Held by the chairman that as the two persons in the minority would, if there had been a poll, have been entitled to more votes than the three in the majority, therefore the decision of the minority must prevail.—Held, however, by the Court, that, as no poll had been demanded, the principles of a plural voting system ought not to have been acted upon, but the decision of the majority on the show of hands taken as final.—The Common Law of all meetings is that votes are to be taken by show of hands, unless Articles of Association, etc., expressly vary this. (48 L.J., Ch., 341; L.R., 11 Ch.D., 109; 40 L.T., 353.)

LANDS CLAUSES ACT.

1878. *Richards* v. *Swansea Improvement Company.*—'Lands Clauses Act, 1845', sect. 92.—Establishment consisting of cottages, yards, shops, bakery, corn-mills, stables, etc., all within a circumscribed ambit, and with internal communication and in one occupation, and user held to be a 'house', so that the whole property must be purchased of him if so the owner required. (L.R., 9 Ch.D., 425; 38 L.T., 833; 43 J.P., 174.)

ADULTERATION OF FOOD.

1879. *Hoyle* v. *Hitchman.*—'Food and Drugs Act, 1875', sect. 6.—An officer purchasing an article for analysis may be 'prejudiced', and therefore may avail himself of the protection of the Act, even although he purchases not with his own money, and not for his own consumption.—*Davis* v. *McLeod* (5 Court of Justiciary [Scotch] 4th Series, 1) dissented from. (48 L.J., M.C., 97; L.R., 4 Q.B.D., 233; 40 L.T., 252; 43 J.P., 220.)

FURIOUS DRIVING.

1879. *Taylor* v. *Goodwin.*—'Highway Act, 1835', sect. 78.—A bicycle is a 'carriage' within this enactment, and the rider may be convicted of 'furious driving'.—Conviction affirmed. (48 L.J., M.C., 104; L.R., 4 Q.B.D., 228; 40 L.T., 458; 43 J.P., 220.)

EXCAVATION IN HIGHWAY.

1878. *Blakeley* v. *Baker.*—'Highway Act, 1835', sect. 70.—Excavation made within five yards of a highway, but duly fenced.—Fence run against by plaintiff's horse and cart, the latter loaded with a weight of one ton.—Fence broken down, cart precipitated into hole, and horse killed.—Held that the fence was sufficient to comply with the statute, and that there was no legal duty on the defendant to provide a fence strong enough to withstand such a shock as the one in question. (39 L.T., 359.)

BUILDING LINE.

1878. *Thomas* v. *Roberts.*—'Public Health Act, 1875,' sect. 156.—A road is none the less within the section for the fixing of a building line merely because it is a turnpike road. (43 J.P., 4.)

LEGAL NOTES AND QUERIES.

'PUBLIC HEALTH (WATER) ACT, 1878.'

Will you please inform me whether a Sanitary Authority is justified in making a charge for granting certificates under section 6 of the above Act.

The Firs, Westbury-on-Trym. W. M. L.

[There is no power given by the Act to make any charge for granting these certificates.—ED.]

COMMON LODGING HOUSES.

As I can find no definition of what constitutes the common lodging-house of section 76 *et seq.* of the Public Health Act, I should feel greatly obliged if you would refer me to any authoritative decision on the subject. PUZZLED.

[The term 'common lodging-house' has not been legally defined since the Act of 1875 was passed, but the question was raised many years ago on the 14 and 15 Vic., cap. 28, when the opinion of the then law officers was taken on the subject. They advised as follows:—'It may be difficult to give a precise definition of the term 'common lodging-house', but, looking to the preamble and general provisions of the Act, it appears to us to have reference to that class of lodging-houses in which persons of the poorer class are received for short periods, and, though strangers to one another, are allowed to inhabit one common room. We are of opinion that it does not include hotels, inns, public-houses, or lodgings let to the upper and middle classes.' By that part of the above definition, which refers to the persons inhabiting a common lodging-house 'being strangers to one another', the law officers, in a second opinion, explained that their 'obvious intention was to distinguish lodgers promiscuously brought together from members of one family or household'.—ED.]

THE DAIRIES, COWSHEDS, AND MILK SHOPS ORDER.

THE *Gazette* of July 10 contains an order from the Privy Council, dated the 9th inst., that the Dairies, Cowsheds, and Milk Shops Order of 1879, and the amendment of the same date, are revoked; and stating that 'it shall not be lawful for any person following the trade of cowkeeper or dairyman to begin to occupy as a dairy or cowshed any building not so occupied at the making of this order until he first make provision, to the reasonable satisfaction of the local authority, for the lighting and the ventilation, including air space, and the cleansing, drainage, and water supply of the same while occupied as a dairy or cowshed'. It will also be necessary to give one month's notice in writing to the local authority of the intention to occupy any such building.

REVIEW.

Naval Dietaries. By Staff-Surgeon JOHN M. HUNTER, M.D., R.N. Reprinted with additions from the Report of the Health of the Navy, 1871. Devonport: Clark. 1878.

THE importance of the question of diet for our seamen is unquestionable, and, as it has excited much interest in these times, Dr. Hunter has been well advised to reissue his paper in its present form. The painful experience of the Arctic expedition, the recurrence of scurvy from time to time among our merchant seamen, and the difficulties often felt in warding it off on even the comparatively moderate voyages of the present time, all combine to show how much requires to be thought of in victualling our ships. The question may be considered in four different aspects, viz.: 1. The actual quantity of food, both as a whole and as separated into the proximate elements; 2. The nutritive values of the different articles of diet; 3. The times and arrangement of meals; 4. The antiscorbutic character of the diet. Dr. Hunter traces the diet tables from 1720 to the present day, as drawn from authentic records, and has carefully tabulated the results, giving the nutritive values as found from the tables of Parkes, Letheby, etc. As regards quantity, the table of 1720 shows albuminates 5·27 ozs., carbo-hydrates 14·67, fat 3·60, and salts 1·38 per diem, a good ration looked at in this way. The bad practice, however, of allowing the purser one-eighth as a perquisite, reduced the above nominal ration by that proportion, whilst the way of issue diminished its value by leaving some days ('banyan'-days) with only a very small amount of food. The sailor's ration in 1871, purser's eighths having been abolished in 1852, shows: albuminates 5·51 ozs., carbo-hydrates 21·3, fat 5·47, and salts 1·30 per diem, a nominally good ration, but only nominally, for the starchy matters are in excess, and the fat being in the form of salt pork is not always eaten or assimilated; the albuminate, also, in the salt beef and pork is only partially available. Dr. Hunter says, 'A strong proof that the diet is an unsuitable one is afforded by the fact that the men usually do not take up a considerable portion of it, especially the biscuit and beef, and with Government allowance from what is thus unused, called "savings", and a small money subscription for each, they purchase other and more suitable food'. This is well contrasted with the dietary of the training-ships, where the growing boys are much better fed, having a total of about 29 ozs. of water-free food, mostly in an assimilable form. Sailors have their breakfast of milkless tea and biscuit at seven, dinner at noon, and supper (same as breakfast) at half-past four, from which time until seven next morning (seventeen hours) they have nothing but what they may provide themselves. This arrangement also obtains in the army, but its effect is worse in the navy, for the opportunities of providing themselves are less, and the men are also called upon for more work at night. The diet is utterly inefficient in antiscorbutics, there being nothing in it of that nature except the few raisins and the small quantity of preserved potatoes and of vinegar allowed, so that, without the ration of lime-juice, scurvy would be as severe as ever.* Dr. Hunter proposes a table of amended diet (p. 11), which gives albuminates 5·37, carbo-hydrates 19·3, fat 4·9, and salts 1·21 per diem, an ample diet for fairly hard work. It has, moreover, the advantage of giving digestible articles, such as American corned beef instead of salt junk, and soft bread instead of some of the biscuit, with the addition of compressed vegetables, a little more preserved potatoes, and a ration of pickles. There is no doubt this would be a better diet in every way, and, even if lime-juice ran short, it would still be to some extent antiscorbutic. This scale, Dr. Hunter says, would actually be one penny per diem cheaper than the present, and he properly suggests that this should be credited to the men monthly. If some such change were made, and at the same time arrangements carried out to give the men a later meal, so as to avoid so long a fast, there is no doubt that it would add largely to their health and efficiency, and be of advantage to the State as well. The perusal of Dr. Hunter's pamphlet will repay the reader who is interested in this important question.

* Dr. Ralph has contrasted the rations of the soldier and the sailor, showing the much better antiscorbutic character of the former.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

THE SANITARY INSTITUTE OF GREAT BRITAIN.

I beg to inform you that your Correspondent, 'Populus' (June 13th) is in error, in stating that the *Sanitary Register* is 'the organ of the Sanitary Institute of Great Britain'.

DANIEL MCCOY, Secretary.
20, Spring Gardens, London, S.W.,
27th June 1879.

THE VENTILATION OF DRAINS.

CAN any of your readers tell me who first ventilated a house-sewer on the distal side? (below trays and main sewer). Mr. Buchan patented the method in April 1875. I have asked him whether he really originated the idea, or adopted it? this he declined to answer. I have also requested him to tell me when he first put it into practice? To this question I have received no reply. The rural sanitary inspector of this district employed the plan before Mr. Buchan's patent. I am sure it would give Mr. Buchan the greatest pleasure if he did not originate the idea, to adopt as his own the generous motto—'*Palmam qui meruit ferat.*' I know that he has the interests of sanitation much more at heart than his own aggrandisement.

EDWARD T. BLAKE, M.D., etc.
Wray Park, Reigate.

We are happy to think that Mr. Sclater Booth has not been blinded by the *couleur de rose* statements of the Cheshire salt manufacturers, with regard to the nuisance caused by saltworks. (Vol. x, p. 392). A counter deputation of landed proprietors waited on him the other day, and Mr. Sclater Booth assured them that the Government would certainly not feel it their duty to exempt saltworks from the provisions of the Noxious Gas Bill, which by the way does not seem to have much chance of passing this session.

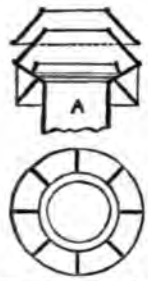
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 414, *vol.* x.)

AIR.—XXIV.

AIR OUTLETS (*continued*).—*Fixed Ventilators for Shaft, etc., concluded.*—In the year 1877 Mr. E. Dunn, of London, introduced a fixed ventilator with double inner conical surfaces, in combination with outer conical surfaces surrounding the same, and furthermore provided with eight radial partitions, between which were wind passages leading to the interior of the apparatus. The inlet spaces were made smaller at the interior than at the exterior part of the ventilator. The lower of the two outer conical plates was attached to the shaft of the ventilator by an inner plate, which prevented the entrance of the air at this part of the apparatus. The upper outer cone was also attached at its inner edge to another conical plate extending all round the apparatus; and above all the cones was placed a conical cap, which had no aperture except at the top, and which prevented any current of air from entering at its sides or bottom. The action of the ventilator took the form of a powerful air-pump.



Dunn's fixed outlet ventilator. A, ventilating shaft.

Dr. Bond, the well-known sanitarian of Gloucester, long since expressed an opinion that if a vertical tube be made to terminate in a trumpet-mouth, and the latter be properly protected by a cap so as to prevent the wind from blowing down directly into it, such a contrivance would afford the best possible exhaust action it is possible to obtain. He therefore constructed a fixed outlet on this principle, and he has arranged for the concentration of the wind before it passes over the trumpet-mouth, by driving it between several converging plates and increasing its pressure. The external air current is thus made a means of exhaust in the tube, and, as the wind-way is not too restricted, the suctional action takes place with the least breath of wind. Dr. Bond has given the name of the Climax to this very simple form of aspirating ventilator.

A B

Dr. Bond's Climax fixed outlet. A, elevation. B, section.

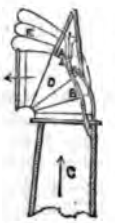
Revolving induced current ventilators, etc.—It may be taken for granted that the first pattern of a revolving ventilator put into use was that which is now everywhere known as the lobster-backed cowl, and which is kept to the wind by a weather-cock arrangement. It varies in shape, but is mostly circular in the outlet aperture. Of late, however, the top of the mouth has been somewhat arched or brought to a peak, with good results. It is also variously spindled, and the facility with which it answers to the wind is the criterion of its goodness. It is undoubtedly the cheapest form of moving ventilator, and its value as an outlet far exceeds that of many so-called improvements upon it.

Lobster-backed revolving outlet.

An excellent pattern of this form of ventilator is evidently copied, in shape at least, from the roof of a malt-kiln, and it possesses several special advantages of its own. The greatest drawback to outlets of this order is liability to stick, and the ease with which they then admit snow or rain. Neither is there any means of removing externally the moisture of condensation should any happen to form inside.

Kiln-top shaped revolving outlet.

The latest improvement brought to bear, both upon the lobster-back cowl and the kiln-top or sugar-loaf back, as it is sometimes called, was that of Mr. Dupré of Jersey. He contrived, in 1869, a form of curved spindle for supporting the cowl, and also for scraping off or preventing foreign matters, such as soot, from accumulating in the cowl. He subsequently, in 1877, made these cowls with the curved spindle, upon which the cowl turns, to revolve within a lubricating cup, filled with lard or other lubricant.



C, ventilating shaft; D, cowl, with vane E; B, curved spindle; A, lubricating cup.

In article No. 22 I fully explained the ventilator of Mr. Miller of New York, which was introduced into England in 1856, and gave an illustration showing its applicability as a fixed air-withdrawing medium. Under the present section of revolving ventilators, I must again mention it, as he claimed that the passing current of air produced a partial vacuum, and caused an upward draught equally well when the horizontal tube was made to revolve, and was provided with a vane, which kept the apex of the cone always towards the wind. The ventilator was duly provided with the necessary openings for passing out the water, and so preventing the influx of rain.

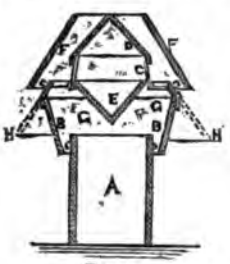


FIG. 1.

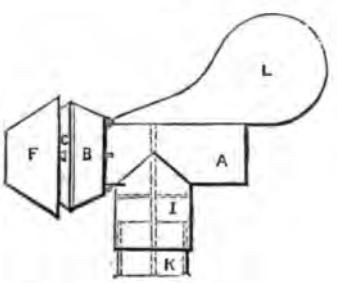
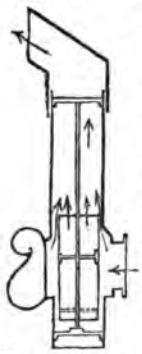


FIG. 2.

MILLER'S ROUND OUTLET VENTILATOR.

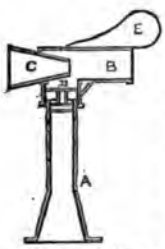
Fig. 1, upright fixed form; Fig. 2, revolving form. A, end of tube; B, lower truncated cone; F, shield; I, spindle fixed on top of tube A at K; L, vane.

In 1862 followed the ventilator of Mr. Noualhier, of Paris, which consisted of the ordinary upright tube leading from the room below, and round the top of which was fitted a second and somewhat larger tube, which covered it for some little distance, and left an annular space between them. The top of this added tube terminated in an open head somewhat tilted up, and it was kept to the wind, as desired, by means of a vane fixed towards its foot. The wind inlet was opposite the vane and at the top of the inner tube, and as the wind rushed upwards the passage of the foul air was naturally assisted.



Noualhier's revolving ventilator.

Without doubt the original idea of the revolving induced current ventilators was published more than a quarter of a century ago. A simple form of it was produced in the year 1864 by Mr. George Bohn, C.E., of Westminster. He fitted upon the top of the vertical shaft a horizontal tube open at both ends, and in one end of the latter he inserted a conical pipe, extending about midway into the horizontal tube. This cowl was fitted upon a spindle, the lower end of which was efficiently supported inside the upright tube. The end of the horizontal tube in which the conical pipe was fixed was kept exposed to the wind by means of a vane. The rushing of the wind through the conical pipe produced a partial vacuum, and caused a suctional draught.



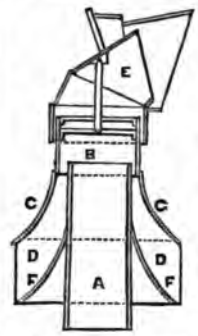
Bohn's ventilator. A, shaft; B, horizontal tube; C, cone; D, spindle; E, vane.

The cone was subsequently—in 1867—introduced into the upright tube itself, by Messrs. Canham and Kreut, of London. A lobster-backed cowl was fitted up, first of all, with a tubular passage fixed in it, the passage being provided with a trumpet-shaped mouth at each end. The cowl surmounting also passed some little distance down over the ventilating shaft, and the whole was supported upon a pivot, which permitted of its turning by the action of the wind. At the upper end of the shaft leading from the room and inside the enveloping shaft of the cowl, two cones were fixed, connected together at their bases, and carrying the pivot, and on one side of this cone was fixed a scraper, to keep the space between the two shafts clear. The wind, therefore, passing in at and through the trumpet-mouth and cross tube, aided the extraction of the foul air, and if any found its way round it and down the outer tube, it was deflected by the cone, and passed out at its base.

Canham's revolving ventilator.

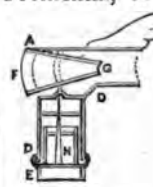
In 1867, Mr. C. Wenner, C.E., of Horwich, Lanc., produced an induction revolving cowl, which was fitted upon the top of a shaft, and was vaned in the usual way, but it had an opening in the back of a smaller sectional area than the area of the exit of the cowl, and into an opening in the back was fitted a horizontal funnel or conical tube, in order to admit the wind. By this means the currents of air from without pressed inwards from the small opening at the back and over the top of, and at right angles to the upcast shaft, and escaped at the large orifice opposite, expanding at the same time, and causing an updraught. To prevent back-draughts, the hood was made of such a length as to allow the current of air which issues from the coned opening to touch the sides of the cowl before passing into the open air.

In 1868 Mr. Noualhier made some improvements upon his revolving upcast cowl, and fixed to the upper and loose tube several assisting plates. The upper portion of the main shaft was surrounded by a concentric tube as before, but vanes or curved plates were arranged upon it in such a manner as to guide the air which escaped round the main shaft into the outer tube, and so on to the external air. The vanes and partitions thus formed separate air-passages, and the air passing through them produced at the top of the main ventilating shaft a circular jet of air, and a partial vacuum at the upper part of the shaft, with an enhanced amount of air-extracting power.



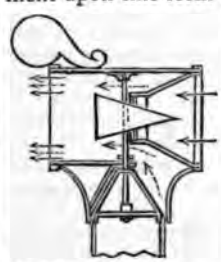
Noualhier's improved ventilator. A, ventilating shaft; B, outer tube; C, vanes or curved plates; D, radial partitions; E, outlet with vane in front.

What was termed by its inventor, Dr. Gourdon-Fromental, of France, an "Aerospire", was introduced into England in 1869. It was composed of two tubes joined at a right angle, and in the horizontal tube a wind-passage tube was placed, shaped like a truncated cone. The larger opening was rivetted to the end of the horizontal tube, and the opposite opening of the cone was only about a third the diameter of the shaft. A lower shaft was also fitted to the above tubes for supporting the pivot and permitting the rest of the apparatus to revolve on its axis, according to the direction given to it by the crested vane. The larger opening of the conical tube was thus always presented to the wind, and the suctional action in the ventilating shaft was of course modified by the strength of the current passing through it.



The Aerospire. D, shafts of cowl; H, pivot; A, horizontal tube with large end of cone, F, fixed to it; G, smaller orifice of cone; B, valve; E, pivot.

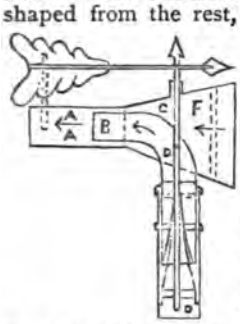
Mr. Robert Boyle produced, in 1870, his improvement upon this form of revolving induced air ventilator. The end of the outlet tube was coned as before, but within it was fixed a diaphragm or air spreader, which caused the air to diverge towards the sides, and this spreader was cone-shaped, the point being directed to the wind. The conical end of the tube was always kept exposed to the direct current of air by means of a vane spindled in the usual manner. Sometimes he fitted an additional cone and spreader to the lower part of the main vertical ventilating shaft, in-



R. Boyle's revolving ventilator. The induced current of foul air is shown by the dotted arrows.

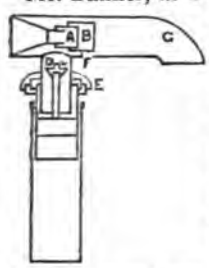
tending to secure the action of the cowl when there was little or no external air-current. The ventilators were, however, mostly manufactured without this additional cone. Several other designs for ventilators of this character were brought out by Mr. Boyle in the same year.

The revolving ventilator of Mr. E. G. Banner was introduced in the year 1874, but Mr. Banner had been previously prosecuting researches in that direction. This ventilator was somewhat differently shaped from the rest, but the action was substantially the same. The larger end of the horizontally-placed funnel-shaped tube surmounting the shaft is kept directed towards the wind by a vane, and the incoming current of exterior air pushes on between two cylinders, one being the funnel itself, and the other a bent tube inside it, and in its passage out at the smaller end of the funnel a vacuum is created at the point of the bent inner cylinder, which by induced action continuously lifts the inner column of foul air, and discharges it outside the ventilator. A proper adjustment of the annular space between the cowl tubes, as well as a justly proportioned length of these tubes, are pointed out by Mr. Banner as most essential to the proper working of the cowl.



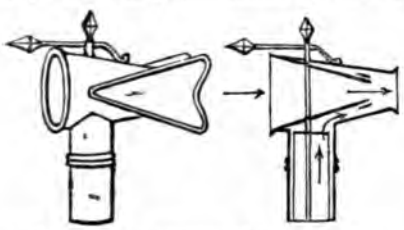
Banner's revolving ventilating cowl. F, wind inlet; A, reduced outlet; C, wind passage; B, inner tube; D, spindle.

Mr. Banner, in a subsequent invention, published in 1877, submits several other forms of cowl. In one example he forms a small covered cup with a screw cap in the interior, so as to conveniently oil the spindle. To keep the cowl steadier to the wind, the outer case is somewhat altered, and the outer end is turned down to prevent eddies of wind in the cowl when it revolves. To increase the usefulness of the cowl, he fits inside several drums expanding slightly towards their outlet ends. The water is prevented from flowing down the tube by a rim at the bottom of the outer cylinder, and drips outside the cowl from certain provided apertures.



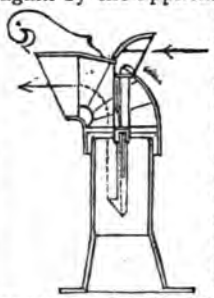
Banner's improved cowl. C, outlet part of tube; A, B, drums; D, oil box and cap.

Shortly after the introduction of the first Banner cowl, a form of revolving outlet working upon the ordinary principle of induction was brought out by Messrs. Scott, Dunn and Co., of London. In this ventilator the vane portion was formed of a couple of ears placed along the centre of the working

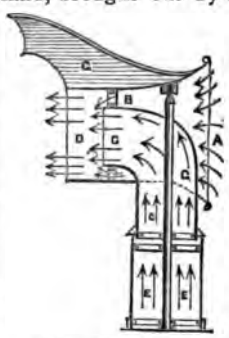


cones, and not surmounting the body, as in nearly all other patterns. The balance was sustained by a weight attached to the head of the spindle, and which projected some little distance over the line of wind entrance. This kind of outlet was very popular, and it also took several forms.

The injector outlet ventilator of Captain Papier was devised on the system of causing a rush of compressed air into the flue and impelling it out again by the application of an angular valve. The wind was received in a small cowl fixed at the back of the cowl proper, and carried down to the angular valve, from which it was deflected up again to the outlet of the ventilator. A vane kept it constantly in such a position as to enable the wind to be forced into and out of in the manner described, the draught being greater in proportion to the violence of the wind. Captain Papier also constructed a fixed form of ventilator upon the same principles, and which I have used successfully.

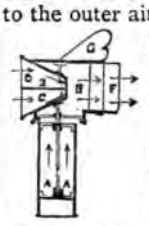


Partaking of the same character of construction as some of the foregoing was the induction cowl of Messrs. Wawn and Willcox, Engineers, of Sunderland, brought out by them in 1875. Over the delivery tube they fixed a cowl made to freely revolve on a vertical centre, and capped with a vane to keep the mouth in the direction of the wind. The end of the cowl towards the wind had a trumpet mouthed shape, and the cowl surrounded the flue way, which was curved at its end, in a line with the course of the wind. A wind current passing through the cowl naturally induced an active current up the shaft. The wind passed into the large end of the casing, and was forced through the annular space surrounding the flue way or shaft, and on to the outer air, causing a partial vacuum in the shaft, and the consequent removal of the vitiated air.



A, inlet end of casing; D, outlet end; B, annular wind passage space; E, shaft; C, curved portion of shaft; G, vane.

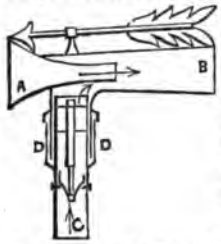
The year 1876 saw the ventilator of Mr. Bury, of Accrington, introduced to public notice. The vertical shaft of this ventilator was led out of the room to the outer air, as usual, and at the upper end was placed a horizontal revolving head. This head consisted of a hollow cone, the smaller end of the funnel projecting slightly behind the central line of the vertical shaft, and the larger end open to the atmosphere, and provided with a horizontal partition plate. The outlet end of the head had also a vertical partition plate projecting beyond the mouth of the outlet, in order to present an additional surface to the wind, and act as an auxiliary to the vane, for keeping the head in the direction of the wind. The partition plates were intended to strengthen the current passing through the head to increase the up-draught through the vertical shaft, and at the same time prevent down-draught. The



Bury's revolving ventilator. A, upright shaft; B, revolving head; C, cowl; E, horizontal partition plate; F, vertical do.; G, vane.

particular horizontal plate across the inside of the cone served, in case of an upward or oblique current of wind, to deflect the same into the cone, and thence through the ventilator head.

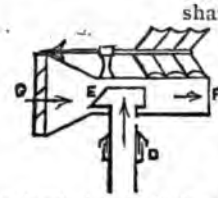
Mr. Buchan, of Glasgow, produced in 1877 his glycerine jointed ventilating cowl, which in shape is not unlike some other induced action revolving cowls, but is greatly improved in several particulars. To prevent, for instance, the horizontal or wind current, which is the motive power, from weakening itself by drawing air from the open joint on which the cowl turns, in place of the up-cast shaft from the room, etc., below, he provides an annular-shaped cup, which he fills with glycerine, a substance not liable to freeze, as was proved by Professor Gamgee, at the Chelsea Ice Rink, in 1876. Mr. Buchan first applied this substance to the revolving parts of ventilators. Upon the top of the glycerine Mr. Buchan places a layer of oil, in case of any tendency of the glycerine to absorb moisture from the atmosphere. The free movement of the cowl is not in any way interfered with by the glycerine luting.



Buchan's glycerine jointed cowl. A, B, horizontal air-tube; C, up-cast shaft; D, glycerine and oil-joint.

Mr. Buchan has also introduced a cowl of this description with a valve action. When the cowl is in use as an outlet cowl, the valve hangs down, but opens to prevent a blow down, should the cowl in turning admit the wind temporarily at the wrong end. If it be desirable, this cowl will also act as a blow-down contrivance, simply by fixing open the valve, and closing at the same time the outlet or smaller end of the horizontal and outer shaft.

Buchan's valved cowl. J, glycerine joint.

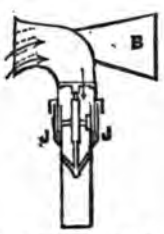


Buchan's valved cowl, with barred wind-passage.

Another pattern of Mr. Buchan's cowl is provided with bars at the trumpet-shaped mouth when intended to act as an inlet, which it does when the inclined valve is open, and the smaller outlet of the horizontal tube is closed. When this arrangement is reversed, the cowl is an outlet.

During the past year, Mr. Buchan also contrived an improved form of the Noualhier cowl, previously explained. In this form of that induction cowl, however, the wind inlet is raked, and not horizontal, which is an evident advantage. He also fits it up with a glycerine joint.

The Noualhier Buchan outlet cowl.



Buchan constant inlet cowl with glycerine joint J. B, vane.

Whilst dealing with these glycerine jointed cowls, I may remark that Mr. Buchan has also brought out an arrangement of this kind of cowl to act as a constant inlet of air to places requiring it. The action is remarkably simple.

An uptake ventilator, in which the use of the cone was largely made use of, was also introduced during the past year by Mr. Brading, of Landport, and it has already commanded a great sale. The apparatus consists of two separate parts, the lower one being a tube to be attached to the ventilator shaft,

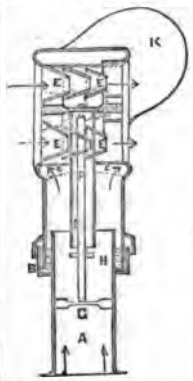


Fig. 1.

Fig. 2.

Fig. 1, Brading's uptake ventilator, section of one pattern. Fig. 2, elevation of another pattern. C, shaft; B, cup; E, cones; G, spindle support; F, spindle; K, vane.

with its upper part, which is the top of the tube, widened out into the form of a hollow cylinder at right angles to the pipe, and within which are placed several sets of frustrums, the end of one cone being inserted into the larger end of the next.

The lower part of the pipe has an annular space formed around it for the reception of some liquid. To the upper part of the cylinder is fixed a vane, in order to keep the ventilator face always to the wind. The vitiated air rising up the ventilating shaft passes through the pipes into the annular space in the cylinder, and is drawn through the interstices between the cones or frustrums by the current of fresh air. As in the case of the ordinary shaped cowls, the foul air from the shaft mingles with the current of fresh air, and both rush through the cones from one side of the cylinder to the outlet on the opposite side. It is manufactured in various metals to suit tubes of four to seven inches diameter. But it is manifestly capable of being made to suit pipes of almost any size.

(To be continued.)

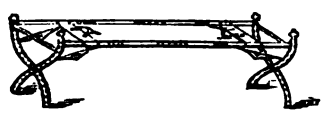
It is stated that the Corporation of London have negotiated the purchase of the Burnham Beeches and the adjacent land.

At a recent meeting of the Metropolitan Board of Works, the question of disposing of certain sites of land under the Artisans' Dwellings Act was under consideration. The Peabody Fund trustees had made offers to purchase six sites at 3d. per foot; and, after a long discussion, it was resolved, by 24 votes against 9, to accept the terms offered, though it was stated that this determination would entail a loss of £600,000 on the ratepayers.

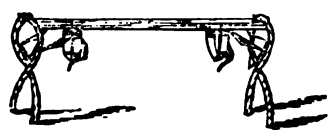
SANITARY INVENTIONS.

STRETTON'S FOLDING BIER AND FUNERAL CAR.

WE are glad to be able to lay before our readers a description of this much-wanted improved appliance for the use of the undertaker. It is calculated to entirely supersede the lugubrious black trestles, which so disfigure the surroundings of burials, and the bier is moreover a vast improvement on anything of the same kind that has preceded it. The bier consists of two pairs of cross bars, hinged together in the centre, about 7 feet apart from each other, and connected with rods on either side, having a distance of about 28 inches between them. This gives ample space to accommodate even the widest coffin, which latter is laid upon two broad straps, fixed across from rod to rod. This bier, which we have carefully compared with others patronised by our largest necropolis companies, is undeniably a great sanitary improvement, and it not only forms a suitable rest for the coffin in the chamber of death but serves the same purpose in the church or cemetery chapel. It has, furthermore, the advantage of acting as a safe barrier when placed over the grave, and as the coffin can be lowered by simple mechanism within the rails of the bier, and as the framework of the latter can be surrounded with evergreens or flowers when in use, the hideous concomitants of woe usually visible at the open grave are entirely eliminated. For the rest the bier can be made either in the commonest wood, complete in itself, in plain and strong fashion at the low cost of three guineas, or in ash, American birch, lancewood, or oak, at intermediate prices ranging up to eight guineas. It can also be ornamentally moulded or chamfered and mounted in brass for some five to seven guineas additional. By the use of this bier the convenience of the bearers is greatly consulted, and it can be carried either under hand or shoulder high with the utmost comfort. It is adapted for either



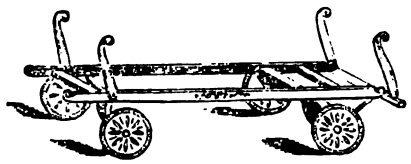
SKETCH OF THE PATENT BIER WHEN OPENED FOR USE.



SKETCH OF THE PATENT BIER WHEN FOLDED UP.

four or six carriers, and by its use and ornamental appearance the mourners are able to dispense with the use of the unsightly pall.

Mr. S. Stretton, M.R.C.S., of Kidderminster, the inventor—a gentleman eminent in all matters of sanitary reform—has also devised for use at funerals, in connection with the bier, a plain or ornamental car, consisting of an open frame upon wheels, upon which the coffin is placed, and which can be drawn to the place of interment with the minimum of labour. For instance, at York during the last week six boys of about fourteen years of age propelled a coffin-laden car of this description for about a mile and a half through the streets with the greatest ease. Its suitability has been tested, and the amplest testimony of its merits have been given in other places. A plain car costs twelve guineas, one decorated in colours fifteen, and an ornamental one, beautifully mounted with brass, can be obtained for the moderate sum of £20. Of course, should any particular pattern of either bier or car be desired these appliances can be carried out in any required design.



SKETCH OF THE PATENT FUNERAL CAR.

We have carefully examined both of these improved contrivances, and we have unhesitatingly come to the conclusion that they deserve universal patronage, both at the hands of the undertaker and the cemetery companies. We are furthermore convinced that the burial boards should largely adopt them, nor would it be out of place for large households and friendly societies, and for hospitals and infirmaries to possess at least one of each of these convenient arrangements. We are happy to know that a high spring-tide of appreciation has already set in in their favour, and that several funeral reform associations have wisely recommended their adoption after a full trial. Both these appliances can be obtained from Mr. A. Stretton, 17, Tything, Worcester, who will forward particulars to inquirers, and who will also state where specimen biers and cars can be inspected.

MATLOCK INVALID COUCH AND BED-REST.

THE Matlock Invalid Couch is an admirably ingenious contrivance, very well adapted for general use in the home and public institutions, and in hospitals The essential character of this invention consists in the use of flattened spiral springs, such as those which have under the name of the Excelsior Spring found so much favour with experienced persons as bed springs and for mattresses. The Invalid Couch and Bed-Rest are very light, cleanly, durable, comfortable, and easily repaired. They are manufactured by Chorlton and Dugdale, 19, Blackfriars Street, Manchester, and well deserve the attention of all who have to provide such comforts for invalids and sick persons.

NOTES ON EPIDEMICS.

[We propose to give from time to time, under this heading, such facts as we can glean from reports of health officers and from other sources as to the etiology and spread of infectious diseases as observed by local investigators. It is highly important to codify these local experiences, but the task has never yet been attempted. We would venture to express a hope that this column may eventually be found of considerable assistance in this regard, and we earnestly invite all medical officers of health to favour us with their experiences. We shall, moreover, be glad to give space, under this heading to discussions on the causation of epidemics, especially of those diseases the origin of which is still obscure.—ED.]

TYPHOID FEVER AND MILK

AN account of an outbreak of typhoid, traced to the milk supply, has reached us from the Antipodes. The medical officer of health for Melbourne has reported to the City Council that a milkman who

had typhoid fever in his family had been supplying milk in a certain neighbourhood of the city, and that no fewer than fifteen cases of the fever had broken out amongst his customers. One of his children has since died of the fever. Mr. Girdlestone thus traces the origin and progress of the outbreak. 'After a careful examination of the locality, and a house-to-house visitation, I have come to the conclusion that the exact origin of the recent outbreak of fever is, as usual, obscure. But there can be no doubt that the disease has been communicated through the milk supplied by one dairyman, in whose house there was a case of typhoid fever which terminated fatally on the 2nd inst. A brief history is necessary to throw light on the course followed by the contagion. In 1878 there were two cases of typhoid fever in a house in Jolimont Terrace, on the high ground, which is at the eastern side. One of these cases terminated fatally at the end of the year, and was quickly followed by two other cases in the same house. In January 1879, the family moved from this house to the country, and there has been no case in it since then. They used to keep their own cow, which was fed at home. In November 1878, a gentleman, then residing with other members of his family at 8, Jolimont Place, was also attacked with the same kind of fever. He recovered in the following December. The disease did not spread, but the family left the neighbourhood on the 1st inst. While at Jolimont they took their milk from Baker's dairy. The next case occurred in the same street as the last one mentioned, a few doors lower down the hill, at 3, Jolimont Place, on or a little before March 19, 1879, in the young man who died of the disease on the 2nd inst. His father, a milkman named M'Auley, served a good many families in the neighbourhood, and continued to follow his calling during his son's illness and after his death. He used to keep four or five cows, which were milked in a small, confined back-yard, behind the house, where also the cans were washed. I am informed that his Jolimont customers were for the most part supplied with milk from these cows, and it was frequently, or perhaps always, delivered by one of his children. He also kept cows in the country, whence he received a considerable quantity of milk for other customers. But the carts which carried the country milk frequently called at his yard at Jolimont Place. Soon after his son's death M'Auley left his residence at Jolimont, but continued to supply milk. I am obliged to refer to this particular dairyman, because all the cases, or nearly all (there being one only which may be doubtful), which subsequently occurred in Jolimont, were among his customers. The result of my investigation is that I have obtained statistics from the 74 different families or households, the domestic servants included, which virtually comprise the whole of Jolimont. Only two or three small families—about six or seven persons—are omitted, owing to absence or other causes. Since January 1879, typhoid fever has appeared in 11 different houses. The first of these attacks was on, or perhaps one or two days before, the 19th of March, and at the dairy in Jolimont-place, as already stated. The next two cases both occurred on the 25th of the same month, in a house in Jolimont Square. From this day to the 15th April inclusive altogether twenty persons residing in Jolimont in ten different houses were attacked. There has been no fresh case after the 15th inst., and no death in the twenty cases. Some are convalescent, but the majority are still ill. Twenty-eight Jolimont families took their milk from M'Auley during the time his son was ill, and it is most significant that all the subsequent attacks in the locality occurred among these persons. That is to say, out of twenty cases of fever nineteen received their regular milk supply, as just stated, and the remaining one, a girl aged nineteen, visited the dairy three times, and took home about a pint of milk on one occasion, of which she drank some in her tea, and a portion by itself, unboiled, eight days before she became ill. Of the remaining families, forty took their milk from other dairies, and of five houses the source of supply is unknown, but in these forty-five households not a single case of fever has taken place. Moreover, infected milk is not confined to Jolimont, and although there are difficulties in tracing its ramifications, I have discovered six houses in other localities in which twelve persons, all supplied with M'Auley's milk, were attacked with typhoid fever between March 23 and the 15th inst.'

SCARLET FEVER AND MILK.

In his Annual Report for 1878 on the Dorking rural district, Mr. E. L. Jacob chronicles the following interesting facts:—

In the middle of the year there was a small, but alarming, outbreak of scarlet fever at High Ashurst, which is partly in the Dorking union, and partly in the Reigate rural sanitary district. The first case appeared in a very mild and scarcely recognised form, on May 26th, in the family of G. J., a farm labourer, some of whose children had lately had it in another part of the county, and had recently returned home. On May 29th, an infant next door took it, from contact with G. J.'s sick child. Between June 1st and 7th, there were fifteen cases in three other distant houses, the inmates of which had not had any communication with the infected houses or persons. They were all supplied with milk, however, from a private dairy, at which G. J. was cowman. He did not himself have the fever, and the milk was not taken into his cottage, but he had continued milking the cows during his child's illness. On the whole, it seemed probable that the specific poison of the disease had thus found its way into the milk, and had given rise to the earliest cases in these three houses. It was noticed that several families escaped which consumed only the scalded skim-milk from this dairy. On June 11th, a young man was attacked in a fifth house. He was a lodger, whose landlady went out nursing infected children during the day, and probably carried the infection home in her clothes at night. On July 18th, a child took it in a sixth house, into which it was apparently introduced by some lodgers, who had arrived from one of the infected houses on the 8th. Altogether, there were 20 cases in seven houses, with two deaths, in that locality.

THE CONTAGIOUSNESS OF TYPHOID FEVER.

As a contribution to this subject, the following well-worked-out account, by Dr. Armistead, of a limited outbreak of typhoid fever last year in one of his districts will prove interesting.

On October 10th, R. S., a servant girl, was taken ill with typhoid fever, at the Vicarage at Dunmow, and went to her home at Lindsell on October 12th, where she died on November 10th. Her sister took her place at the vicarage, and was taken ill with typhoid fever on October 22nd; was removed to the

Workhouse Infirmary on October 26th, and recovered. From what source the contagion was introduced into the vicarage, in the first instance, is still doubtful; and whether the second case took the contagion at Lindsell on October 12th, or at the Vicarage after she arrived, is also doubtful. In either case the period of incubation of the disease could not have exceeded ten days. At Lindsell, after R. S. went home, the disease spread to her father, who began on October 26th; and on October 31st, to a niece living in the same cottage. The next victim was a girl, aged 10, living in the next cottage but one, who, on or about November 1st, took some milk to R. S., and began with typhoid fever on November 15th. Another girl, about the same age, living in quite another part of the parish, when on her way to school one day, near the end of October, called at S.'s cottage for a drink of water, and on November 15th (14 days afterwards), she began with typhoid fever.

Some observations of great value on this subject are also contained in the last report of Dr. Bond on the Gloucestershire combined sanitary district—a report which is brimful of interest to the student of etiology. Dr. Bond gives an interesting sketch of the course of an outbreak of typhoid fever, which commenced at Cirencester and worked its way back to its point of origin some six months after, having made a circuit of ten or twelve miles. A young woman who had been in service at Cirencester went home to her village with enteric fever. An impression got about in the neighbourhood that the disease was not infectious, and the result was that a sister, who was allowed to sleep with her, took the disease, and she was followed by three other members of the family, and by the occupant of a neighbouring cottage, who had been in the habit of frequenting the infected house. From this village the disease was carried to another three miles off by a man who visited a house in the first village, where his brother was lying ill with typhoid, and took away two children to his own house. This man and his father were both attacked by typhoid, and the father died. Two younger sons who, though they slept in the house with their father and brother for a few days after the latter were taken ill, were removed as soon as the nature of the illness was distinctly made out, were also struck down, and one died. Meanwhile an old woman who was sent by the Board of Guardians as a nurse to the family, and who, having acted for some years as a nurse in an infectious hospital, might have been thought to be fever proof, succumbed to the disease. From this case, or possibly from it and another, the infection spread to a young woman, who appears to have washed their clothes, and here it seems to have rested.

The moral of this little history Dr. Bond takes to be that what is commonly called 'typhoid' fever is, under certain circumstances, an excessively infectious disease. Whether it be communicated by emanations from the sick person himself or from his excretions, is practically not a matter of much moment, so long as it be once admitted that the atmosphere of the sick room and the clothes and other harbourers of infection which have come from it may be the media through which it may find its way into the system of susceptible persons, and so infect them. 'To some persons,' says Dr. Bond, 'such an inference may seem to be so obvious as to be a mere truism; and yet it is certain that there is a considerable number of medical men who, from their experience of the general impunity with which typhoid patients are treated in the wards of general hospitals, and in the well-ventilated rooms of the well-to-do, without the disease spreading, assume that its infectiveness is not more virulent in the cottages of the poor. I am convinced that such an idea is most fallacious, and that, even admitting that all forms of continued fever are not equally infectious, it is much better to err on the side of excessive caution, and to prohibit unnecessary intercommunication between the healthy and the sick, even in cases of simple continued fever, than to run the risk of allowing an apparently mild type of the affection to develope, as it appears often to do, into a virulent one, by transference into more congenial soil.'

SANITARY JOTTINGS.

At the meeting of the North-Western Association of Medical Officers of Health, on the 4th inst., the new dairies and milk-shops order was discussed. It was urged that the inspector under the order should be a qualified veterinary surgeon, that general administration should be by the medical officers of health instead of by the police, and that the putting of an order into effect should be compulsory.——An additional pavilion is to be built at the Stockwell Fever Hospital, at an estimated expense of £6,000.——We are glad to find that the Teignmouth Local Board are taking steps to provide themselves with a hospital for the reception and isolation of any cases of infectious disease that may break out at that favourite watering place. Some objections appear to be raised to the site, but this is inevitable in the case of a hospital for infectious diseases.——At the last meeting of the Bath Urban Sanitary Authority, Dr. Brabazon, Medical Officer of Health, reported that the rate of mortality for the city during the past week was unusually low, being only 10.04 per 1,000.——The Institute of Civil Engineers have awarded a Telford premium to Edward Dobson for his paper on the Geelong Water Supply, Victoria, and to George Higgin, for his Experiments on the Filtration of Water.

BIBLIOGRAPHY.

Amsler.—Bedeutung des Kalks in Trink und Mineralwässern. (*Oesten ärztl. Vereinsztg.*, Wien, 1879; iii, 9-11.)

Alexi and Chalybæus.—Ueber die Zahl der Schulstunden und deren Vertheilung auf die Tageszeiten. (*Dent. Vierteljahrschr. f. öff. Gesundheitspfl.*, Braunschweig, 1879; xi, 28-76.)

Arnoud.—Conditions de salubrité des ateliers de gazage dans les filatures de coton. (*Ann d'hyg.*, Paris, 1879; 35, i, 97 128.)

Bregi.—Le lait à Paris. (*Mouv. Méd.*, Paris, 1879; xvii, 19.)

Black.—Relation of Chronic Diseases to Unhygienic Influences. (*Cincin. Lancet and Clinic*, 1879; N. S. ii, 101-106.)

Chapman.—Cases of Sickness and Death, attributed to use of water contaminated by leakage from a slop drain. (*Rep.* Bd. Health, Mich, 1878; vi, 60.)

Cameron.—Amount of Solids in Milk. (*Analyst*, London, 1879; iv, 11.)

Deutsch.—Die Internirung der Seuche. (*Pest Med. Chir. Presse*, Budapest, 1879; xv, 107-111.)

Epuration et Utilisation des eaux de ville par l'irrigation. (*Pan Méd.*, 1879; iii, 194.)

G.—Is Alumina a desirable or healthful constituent of our daily food? (*N. Orl. M. and S. J.*, 1879; vi, 805-809.)

Galippe.—De l'usage des vases culinaires en cuivre. (*Art. Méd. Bruxelles*, 1879; xiv, 354-358.)

Guernsey.—How condensed milk is prepared. (Hahneman, *Month. Phil.*, 1879; i, 203-211.)

Galt.—Sanitary outrages (in schools.) (*Louisville Med. News*, 1879; vii, 61.)

Hygiene et éducation de la première enfance. (*J. d'hyg.*, Paris, 1879; iv, 75-78.)

Hitchcock.—Concerning the relation of wood pavements and wood sidewalks to public health. (*Rep.* Bd. Health. Mich. 1878; v 39 46.)

KERN.—Is contaminated water injurious for domestic purposes? *Chem. News*, Lond., 1879; xxxix, 28.)
LIERNUR.—Ueber Strassenreinigung in den Städten. (*Monatsbl. f. öff. Gesundheitspfl.*, Braunschweig, 1879; ii, 1-9.)
MILNE.—Notes on the analysis of butter. (*Analyst*, London, 1879; iv, 40-44.)
NAPIUS ET DUBUISSON.—Enseignement de l'hygiène dans les campagnes. (*Ann. d'hyg.*, Par., 1879; i, 68.)
PALMA.—Hygienic value of water. (*Voyenno Med. Journal*, St. Petersb., 1878; cxxxi, 9-151.)
PHILBRICK.—Water supply for small towns. (*Plumber*, N.Y., 1878; i, 189, 214, 211; 1879, ii. 5, 37, 72, 97.)
REICHARD.—Die Bedeutung eines guten Gehörs für die Schulbildung. (*Gesundheit Elberfeld*, 1879; iv, 109-111.)
RIANT.—Des latrines scolaires. (*Arm. d'hyg.*, Paris, 1879; i, 142.)
RICHARDSON.—Health and recreation. (*Pop. Sc. Monthly*, N.Y., 1879; xiv, 780-794.)
WOLFFHUGEL.—Die Grundluft und ihr Kohlensäure gehalt. (*Aerztl. Int. Bl.*, Munchen, 1879; xxvi, 31-41.)
GORDON.—Erläuterungsbericht zu dem Dispositions. Plan über die Anlage von Spülkanälen in der Kgl. Haupt und Residenzstadt Stuttgart ind. Heslach und Berg. Im Auftrag des Gemeinderathes bearbeitet von T. Gordon, Stuttgart. W. Kohlhammer, 1874.
MICHÆLIS AND GORDON.—Die Canalisation der Stadt Dartmund. Gutachten im Auftrage der Städtischen Behörden, gegeben von dem Königl. Baurath Michaelis und Ingenieur Gordon. Dartmund, 1878. Fr. Wilh. Ruhfus.
GORDON.—Die Canalisation der Kgl. Haupt und Residenzstadt. München Berich im Auftrage des Magistrates erstatted von J. Gordon. München, 1876. E. Mühlthaler.

APPOINTMENTS OF HEALTH OFFICERS, ETC.

MOORE, T., F.R.C.S., S.S.C. Cantab., has been appointed Medical Officer of Health for the Petersfield Rural Sanitary District.
WEBSTER, Mr. T. L., has been appointed surveyor of the Malton Local Government District.

SANITARY PATENTS.

ABSTRACT OF SPECIFICATIONS.

3406. Obtaining water from Artesian and other wells.
In order to obtain a supply of pure water and to dispense with gathering mounds and long conduits a hole is bored through the water-bearing strata and the water enabled to rise in the bore-hole to the level of the underground water of the district in which the hole is bored. If the bore hole be situated and the water obtained above the level of its distribution a syphon is formed, the long arm thereof having air valves, and forming the main, while the short arm dips into the bore hole deep enough to reach the water level. The pipe forming the short arm is of the diameter of the bore hole, so as to form an air-tight lining, which is puddled round for a suitable depth from the furnace.

988. Utilising the fall of sewage, M. Birkhead, Liverpool.

1201. Water closets, G. W. von Nawrocki, Leipzigerstrausse, Berlin, Germany.—A communication from D. Meerowitz and N. Gubieff, St. Petersburg, Russia.

3303. Dry earth closet pans. M. Underwood.
This consists of a pan to receive the earth and excreta, an under pan which receives the soil and excreta, and which, by levers, discharges the earth and excreta backwards and downwards through a pipe or other orifice, and closes such orifice, acting as a trap.

3524. System of sewerage and apparatus therefor. J. Shone.
This consists in applying a closed receptacle or reservoir to receive the sewage from a point or number of points, and supplying such receptacles with compressed air or gas as an emptying motor, which shall be called into operation by the act of the receptacle at any point becoming full or charged, and after emptying such receptacle the air or gas is allowed free exit by the automatic action of a valve apparatus operated upon by the sewage within by means of a float.

3536. Ventilators for room. L. Cogan.
A fan is placed inside a case communicating with the chimney flue. This fan is mounted horizontally on two centres, so as to revolve freely in one direction, so that the vitiated air in the room is carried into the chimney through the aperture of the fan between the slanting blades thereof as it revolves.

1458. Warming and ventilating. L. H. Hauber, Munich, Bavaria.

3661. Drain-pipes. E. Brooke.
The pipe is formed double, having two distinct passages, the upper being employed as the sewer-pipe and the lower as the sub-soil pipe. Where separate pipes are used, as at present, a continuous longitudinal rest is placed on top of the subsoil-pipe, to support the sewer-pipe, openings being made in the rest to allow room for the sockets of the sewer-pipe.

3669. Supplying water to water-closets. J. W. Purnell.
A cistern or tank has a capacity equal to the quantity of water which it is desired to discharge at one time, such water being supplied by a ball-cock, which is either connected to a large cistern or directly to the water main. Within this cistern is a syphon, one leg of which passes down to near the bottom of the cistern, while the other passes down through the cistern and is connected to the pipe leading to the water-closet.

1616. Connecting house drains with sewers. W. H. Fox, Barrow-in-Furness, Lancashire.

3746. Filters or filtering material. W. White.
This consists in the employment of a combination of oxide of iron, carbon, and alumina, well worked together and calcined in a close retort or kiln to produce any desired form of filter or filtering material.

3748. Cistern filters. C. E. Haycraft and E. Johnson.
A circular container is constructed having a solid bottom with an aperture in the centre, over which is placed a perforated tube or a cylinder of highly porous earthenware block charcoal. Another tube more finely perforated slides inside the first tube. To the upper end of this inner tube is attached a hollow rod or shaft for moving the sliding-tube up and down, and to allow access of air each time that water is drawn from the filter. The perforations in these tubes are so regulated that they filter the water at a slower rate than the flow from the discharge cock of the exit pipe, which is so proportioned to the rate of filtration that a partial vacuum is created in the bottom of the filter, so creating a down current of air through the centre tube.

3898. Soil-pipes. G. A. Heron.
The pipe joining the closet with the main soil-pipe is divided into two parts above the Y-shaped junction which connects the two, and a space separates the divided ends. The open end next the soil-pipe contains a movable piece long enough to join the upper and lower portions of the pipe. This movable piece is actuated by the opening or closing of the closet lid, so that when not in use the sewer-air escapes into the open air instead of into the house through the closet; but when the lid is open the junction between the closet and the soil-pipe is effected by the sliding-pipe.

3794. Automatic ventilators. W. Symonds, jun., and G. B. Symonds.
A louvre board is pivotted in a frame, and in its normal position is at an angle of 45 degs. One pivot extends through the frame and passes through a metallic disc, the upper periphery of which has two notches for locking the ventilator. In front of the disc is a second disc of non-conducting material placed on the same pivot, and forming a contact breaker or maker. On the upper portion of its periphery this disc is a plate connected with one pole of a battery, and the two discs are connected by a cranked connecting rod with the armature of a number of electro-magnets arranged in pairs, one set being for opening and the other set for closing the ventilator. An ordinary maximum and minimum electric thermometer is suitably connected with the battery and the magnet, so that when the mercury rises in the maximum tube the ventilator will be opened, and when the mercury falls it will be closed. Above the first disc is a pivotted armature with a catch for taking into the notches in the disc, and above the armature is a pair of electro-magnets connected with and operating simultaneously with the opening and closing magnets.

3884. Syrup to be used for digestible purposes in food. E. Beanes.
Wort is evaporated at a temperature sufficiently low so that the distase is not injured, and is converted into a syrup containing the distase previously existing in the grain in an active form.

4552. Trapping and ventilating house and other drains. W. C. Woodhead.
This relates to improvements on patent No. 267, dated 21st January, 1878, and consists of a rectangular box placed outside the building, and divided into three compartments by two transverse vertical partitions. In one outer compartment is an inclined floor, from which depends a deep lip reaching to near the bottom, and serving as a trap. This and the third compartment are covered by a grating, whilst the middle compartment is closed by a lid. In the end of the box is an opening just above the inclined floor, through which the drainage is discharged. In the middle compartment is a tray formed of pierced metal, and below it is an opening for the passage of the drainage to the third compartment. The first and second compartments are connected by an opening above the tray of the second compartment, and below the inclined floor of the first. The water runs into the box and falls over the floor to the bottom of the first compartment, and passing under the lip discharges itself through the opening in the partition on to the tray, which will arrest any fat the drainage may contain, and the water passing through the tray will escape to the third compartment, whence it is discharged into the drain, which is ventilated as described in the former patent.

4483. Preparation having nourishing and medicinal qualities. A. Nelson.
Milk is charged with carbonic acid gas at a high tension in the same way that aërated waters are charged, and the beverage so formed may be still further medicated by the addition of lithia, soda, potass, magnesia, seltza, quinine, or other medicament suited for the cure or alleviation of different ailments or diseases.

4565. Dry closets, etc. J. Banner.
A compartment for the deodorant is formed behind the pan, which rests by its rim partly on a curved portion of this compartment and partly upon a pair of parallel arms forming continuations of the curved part. The sides of the compartment are inclined so as to direct the deodorant towards the middle. Between the floor and the basin is a channel through which a shovel can be inserted so as to remove a sufficient quantity of the deodorant for the solid excreta in the pan. The deodorant consists of shale-clay, permanganate of potash and light carbonaceous matter. A six-way cock is employed to separate the liquid and solid excreta, and to flush the urine division of the pan, the water then passing to a separate receiver.

ORIGINAL PAPERS.

THE CAUSES OF DIARRHŒA PREVALENCE AT LEICESTER.

By William Johnston, M.D., F.G.S.,
Assistant Officer of Health for Leicester.

Of the whole class of zymotic diseases, diarrhœa is the one which demands the greatest effort to be put forth towards an investigation of its causes. This disease possesses prior claim upon our attention for the following reasons:—1st. Amongst urban populations, if an average be taken for a number of years of the deaths which each zymotic disease has induced, it will be found that the number accredited to diarrhœa considerably exceeds that of any other of this class of maladies. 2nd. The majority of the victims are children. 3rd. The wide difference of opinion that is observed to exist amongst health officers with respect to its mode of causation, and which in turn gives rise to hesitancy and apathy on the part of the sanitary authorities throughout the country in their adoption of measures for the mitigation of the disease. 4th. The disease arises from causes pre-eminently under control. Leicester has for some years gained unenviable notoriety for a high diarrhœa death-rate, and the death-rate from this disease, during 1878, was again very high, 5 deaths being registered in the first quarter, 14 in the second, 266 in the third, and 17 in the fourth, showing a total of 302. My remarks will be confined to the mortality sustained from this disease during the third, or summer quarter of the year.

Comparing the zymotic death-rate of Leicester with that of the 20 larger English towns, it is observed: 1st. That it reaches, with but two exceptions, a higher limit than any other town; 2nd. That the mortality from zymotic disease, other than diarrhœa, is small, and bears most favourable comparison with the other towns; 3rd. That it is mainly due to diarrhœal fatality, which here surpasses that of all the others, Hull alone excepted. Again, when compared with the diarrhœal rates of fifty other English towns, that of Leicester is found to exceed any of them.

Annual Death-Rate from Diarrhœa in England in 51 Large Towns during the Third Quarter of the Year 1878.

Towns.	Annual Rate per 1,000.	Towns.	Annual Rate per 1,000.
Exeter	3·1	Chatham	1·3
Devonport	2·9	Maidstone	3·4
Bath	1·5	Dover	2·3
Cheltenham	1·7	Hastings	1·6
Shrewsbury	2·0	Southampton	1·9
Stoke-on-Trent	3·3	Reading	2·4
Walsall	2·7	Oxford	4·1
West Bromwich	2·3	Northampton	7·6
Dudley	2·7	Cambridge	5·0
Worcester	4·4	Colchester	2·1
Coventry	4·1	Ipswich	7·1
Lincoln	6·3	Yarmouth	5·1
Derby	3·6	Stockport	5·5
Barrow-in-Furness	4·5	Macclesfield	2·5
Huddersfield	2·3	Chester	1·2
Halifax	1·3	Birkenhead	2·5
York	4·9	St. Helens	8·1
Middlesborough	4·9	Wigan	6·4
South Shields	3·6	Bolton	4·8
Gateshead	4·5	Bury	3·2
Tynemouth	5·5	Ashton-under-Lyne	3·3
Carlisle	3·1	Rochdale	2·4
Newport	3·9	Blackburn	4·8
Cardiff	3·0	Preston	7·8
Merthyr Tydfil	0·3	Leicester	**8·7**
Swansea	2·1		

This prominent position which the Leicester death-rate occupies amongst those of other communities, has now, with but slight variation, been maintained for four consecutive years.

In accordance with the request of the Sanitary Committee, I made a house to house visitation to all dwellings where deaths occurred from the disease during the summer quarter (the third) and the last few days of June 1878. The result of the inquiry is given below. Nine deaths were registered from diarrhœa during the last week in June, so that the total number arising from the epidemic amounted to 275. Nine of these cases were adults, whose ages were 73, 79, 83, 34, 64, 66, 31, 84, and 86 years respectively; further inquiry was not made concerning them. Out of the 266 infantile cases there were 28 of whom I could gain no information, the parents having either changed their residence or left the town. There were also 10 illegitimate children, about whose fathers no reliable information could be obtained: particulars of the fathers are therefore given in only 228 instances.

I found that 242, or 88 per cent., of the children had not completed one year of life, that 76.5 per cent. were healthy children at the time of birth, that 165 of the children were suckled, 56 bottle fed, 17 fed upon a mixed diet, *i.e.*, the breast milk supplemented with either arrowroot, sago, or corn flour, etc. I do not here intend to comment upon these figures further than to remark that they offer a good refutation to the theory that 'hand-feeding' is the chief factor in the causation of the disease.

The average period of sickness was equal to nine days and two hours. As to the *health* of the parents, (*a*) of the 238 mothers, 213 were in good heath, 25 delicate; (*b*) of the 228 fathers, 219 were in good health, 8 delicate, 1 was consumptive. These figures, like those under the same heading for 1877, disclose the fact that the disease is in no way dependent upon the degenerate constitutions of the parents.

As to the *ages* of the parents, (*a*) of the 238 mothers, 5 were under 20 years, 53 were over 20 and under 25 years, 92 over 25 and under 30, 70 were between 30 and 40 years, and 18 over 40 years; (*b*) of the 228 fathers, 1 was under 20 years, 35 were over 20 and under 25 years, 88 over 25 and under 30, 76 between 30 and 40 years, and 28 were over 40 years. Early marriages can therefore, as far as Leicester is concerned, have exercised no influence in the question of diarrhœa causation.

188, or 79 per cent., of the mothers did *not* go out to work, and the remaining 50, or 21 per cent., were employed in various branches of labour which necessitated their daily absence from home. This latter percentage is very much below what is found amongst the manufacturing towns of Yorkshire and Lancashire, and would go to prove that, whatever may be the experiences of other towns, maternal neglect does not account for the high infantile death-rate in Leicester during the summer of last year.

As to the sanitary requirements of the premises where the deaths occurred, 193, or 81.1 per cent., of the houses were supplied with waterworks water, and the remaining 45, or 18.9 per cent., were provided with pump water from surface wells. The water of many of these wells had been analysed and pronounced potable. The water supplied to the town by the Waterworks Company is a pure upland water; and the diarrhœa of Leicester is, therefore, clearly not dependent upon an impure water supply. 100, or 42 per cent., of the houses were provided

with water closets; 127, or 53.4 per cent., were provided with pails; and in only eleven instances were privies found. If a similar inquiry were instituted in most of the other large towns, I am of opinion that very few of them would be found so creditably provided, and free from filth and its receptacles, as this return proves to be the case in Leicester. 220, or 92.5 per cent., of the houses had large and open yards attached to them. 17, or 7.1 per cent., had rather confined yards, and in one instance there was no yard.

Looking broadly at the results of this inquiry, it must be evident to unprejudiced observers that the physical organisation of the children at birth, their subsequent mode of alimentation, their social relationships, and their domiciliary surroundings, all fail to account for the inordinate diarrhœal prevalence and fatality experienced amongst the infantile population of the town. We must look for the cause in an influence much wider in its operation; for, as I shall subsequently show, all ages of the population were simultaneously affected with the disease, and its prevalence was proportionately greater amongst youth and grown-up people than infant children.

Early in the summer of last year, the Sanitary Committee of this town, with a view to lessen, if possible, the fatality from the disease, determined upon supplying medicine *gratis* to the artisan and poorer classes. In the adoption of this measure the Committee were chiefly influenced by the good accounts received from Manchester, where a similar line of action was resorted to. On the 10th July I directed that the addresses and ages of all the persons for whom medicine was given should be entered, so that I might ascertain the ages of those affected and the districts where the disease was most prevalent. The following is an analysis of the entries from the 10th July to September 30th.

Total number of cases affected, 3,318. 1st. Of these 3,318 cases, 1,390 were children under five years, and 1,928 adults and children over five years; thus showing that the disease was more prevalent amongst adults than children.

2nd. The applications from houses where more than one was affected with the complaint were 481 in number, viz.:

Houses having	7	persons	suffering	from	diarrhœa,	1
„	„	6	„	„	„	3
„	„	5	„	„	„	8
„	„	4	„	„	„	22
„	„	2 or 3	„	„	„	220

3rd. Houses having the parents affected with the children, 227.

The history of these multiple cases was, almost without exception, that first one became affected with the disease, and that the others subsequently suffered from it.

During July, and up to August 9th, I was engaged in rather lengthened microscopic examinations of the bowel discharges from infants and adults, and during this time I suffered from repeated attacks of the disease. These personal experiences, especially when taken in conjunction with the facts mentioned above under paragraphs 2 and 3, have convinced me that 'summer' diarrhœa is *contagious*, and that the chief vehicles of the poison in the above instances were the ejecta from the bowels of previously infected persons.

A microscopic examination of the bowel discharges of infants, children, and adults affected with the disease, revealed the presence, in each case, of innumerable bacteria (bacterium termo and micrococcus). These organisms are the active agents in causing putrefaction in all liquids containing animal organic matter. The stools varied exceedingly in appearance, some being deeply tinged with bile, while others were of a pale clay colour; they were alkaline in reaction, and most offensive in odour. I also found bacteria in the vomited matters of children affected with diarrhœa.

Artificial Feeding.—The first theory I shall notice that is advanced by many as the chief cause of the disease is artificial feeding. We all know that this habit is very prevalent amongst mothers in town populations, and we are all equally aware of the fact that its adoption tends very materially to enfeeble the infantile organism, and so render it more unable to withstand any disease-inducing influence surrounding it. No member of the profession deprecates more strongly than I do the adoption by mothers of this unnatural custom, and I am fully satisfied that much infantile mortality might be averted by its discontinuance. At the same time I think that the evils ascribed to artificial feeding are, just at present, very much over-estimated, and with respect to its being the principal cause of the diarrhœa fatality of our large towns, I am of opinion that the facts to be gleaned from last year's epidemic by no means lend support to such an assumption. If we refer to the facts already given, we shall find that of the 238 deaths about which full particulars could be obtained, no fewer than 165 or 69.3 per cent., were breast-fed.

In the infantile cases which occurred amongst my own patients, and to which I have previously referred as having bacteria in their vomit, most of them were breast-fed, and had never from their birth received artificial food of any description whatever. Again, the development of last year's epidemic was sudden and contemporaneous over certain districts of Leicester, and *the disease affected all ages simultaneously.* This affords strong proof that the cause in operation was rapidly diffused through a medium common to these inhabited areas. *Nothing like a limitation of the disease to the infantile portion of the population was observed.* The mortality arising from it was, as we have seen, almost entirely confined to infants, but this is not to be wondered at when we take into consideration the delicate constitutions of the victims.

A few facts relative to the diarrhœal mortality sustained in other towns during the summer quarter may not here be out of place. The industries of Oldham and Bradford employ a greater percentage of female labour than most other manufacturing towns, and certainly much more than Leicester. Notwithstanding this, however, Oldham suffered the least fatality from the epidemic of any of the twenty large towns, and Bradford, with a surplus population of 64,000 over that of Leicester, sustained only 36 per cent., the actual mortality of the latter town. *A similar disparity is observed in the diarrhœal death-rates of towns engaged in similar branches of industry and employing much the same proportion of female operatives—e.g.*, Halifax enjoyed a remarkable immunity from the disease, its diarrhœal rate for the summer quarter being only 1.3 per 1000; but for the same period the rate in Leeds was 6.6, in Preston 7.8, and no less than 8.1 in St. Helens. From my own personal knowledge, artificial feeding is carried on to an enormous extent in Halifax and Oldham, and if the disease mainly depended upon

this custom, one would be prepared to find both towns suffering from heavy yearly inflictions of diarrhœa; instead of this, both places enjoy a remarkable immunity from the malady. To take another striking example, Bristol and Hull are both seaport towns, and their employment of female labour bears but a small percentage to their populations. Bristol, however, was noted for its low diarrhœal death-rate, whilst Hull, during the same quarter, experienced a higher fatality from the disease than any other English town. In my notes of some cases of the disease that came under my care last summer, the following entries occur, amongst numerous infantile cases :— Case I. Engine driver, aged 30 years, suddenly seized with profuse diarrhœa, griping, and sickness; stools bilious, watery, and swarming with bacteria. Case II. Bricklayer, aged 29 years, of robust constitution, suffering from frequent purging, much griping, with sickness and tenesmus; motions contain innumerable bacteria and great numbers of crystals of triple phosphate; two of his children also suffering from the disease at the same time. The number of adult cases thus notified by me amounted to 15; they were all over 25 years of age, and were affected with symptoms varying but little from those above described. Neither artificial feeding nor maternal neglect could account for the disease in these cases, and I think it unreasonable to attribute the causation of a disease affecting all ages of a population to a custom that does not even generally affect its infantile section.

The other theories advanced as causes of diarrhœa are, impure water, maternal neglect, want of cleanliness and ventilation.

We have already seen, as regards the water supply to the houses where deaths occurred, that 193, or 81.1 per cent., were supplied with the Company's water, and only 45 with pump water (18.9 per cent.) The Company's water is plentiful and the supply constant. Several analyses of the water during the summer showed that it was of excellent quality. The disease, in Leicester, is therefore not dependent upon bad water supply. The closet accommodation to the houses was also good; only 11 privies were met with, the remaining 227 habitations having either pails or water closets provided. The removal of ash-bin refuse is most efficiently carried out. These figures afford conclusive evidence that the disease, as far as Leicester is concerned, is neither dependent upon filthy conditions of its surface, nor due to any want of the ordinary sanitary requirements for external cleanliness.

A somewhat striking fact was also elicited during my enquiries into the particulars attending last year's epidemic. In the courts throughout Leicester and amongst their occupants, more filthy tenements, more squalor, less facilities for house ventilation, greater maternal slovenliness, and deeper degrees of poverty, are found to exist than in any other district or section of its general population. The mortality, however, occasioned by the disease amongst the progeny of these people was not found to exceed that experienced by the inhabitants of more open districts of the town; but, on the other hand, a somewhat remarkable fatality took place in some wide open streets, newly-built, and situate upon the extreme margin of the town.

All the evidence I have now submitted, in discussing the generally accepted theories of the causation of diarrhœa, tends to show that the ascribed causes fail to account for the wide variations in the mortality experienced each summer quarter in English towns.

Meteorological Conditions.—Before entering upon this subject, I may state that I consider atmospheric conditions act only as excitants of the disease, and this only applies to localities where other conditions are met with that act powerfully as predisposing causes; for I feel assured that if we could discover any particular town or district, the sanitary machinery of which was in perfect working order, the vicissitudes of climate would there be found to be perfectly harmless in the production of diarrhœa.

I have arrived at the following conclusions with respect to the weather conditions that seem to influence diarrhœa mortality, after a careful tabulation of the meteorological conditions and diarrhœa mortality experienced during the summer months of each year since 1866. The prevalence of the disease appears to be governed by three weather conditions— viz., temperature, atmospheric humidity, and rainfall, and these follow in the order of their importance. The combination that seems most potent for evil is high degrees of heat, great atmospheric dryness with little or no rainfall. This combination was experienced throughout July of 1868, and the diarrhœa mortality was greater than has ever since been recorded. Very high temperatures prevailed during the months of May and June of the same year. The combination most unfavourable for the disease seems to be prevailing low mean temperatures ranging from 57° F. to 58°.5, in conjunction with high degrees of atmospheric saturation and more or less continuous rainfall. The least mortality (eighty-six cases) was experienced in Leicester during a prevalence of these conditions in the summer quarter of 1866. From the charts of the previous twelve years I think this general law may be gathered: that a continuance for a week or ten days of a mean daily temperature of 59° or over, in conjunction with a scarcity of rainfall and low degrees of humidity, and occurring during any period from the twenty-fifth to the thirty-seventh week, is sufficient either to provoke the disease or increase its prevalence. A hot June month invariably hastens its appearance.

The diarrhœal epidemic of 1878 appeared in the town at a much earlier date, and was more suddenly severe than in the previous year. This was undoubtedly owing to the intense heat and dry weather experienced during the latter part of the June month. The continuance of drought throughout the greater part of July, and the recurrence of very hot weather from the 17th to the 22nd of that month, occasioned still greater prevalence of the disease and added considerably to the fatality. The weather conditions at Oldham were very similar in character to those at Leicester, but the mortality in the former town was quite insignificant when compared with the sustained high rate in the latter place. To most minds, a careful comparison of these facts will afford convincing proof that the disparity here shown to exist between these two manufacturing towns cannot depend upon relative excellence in the habits of the people. The marked difference in the deaths of both towns can only, in my opinion, be accounted for by the wider influences arising from *differences of site*. In topographical character, the site which Oldham occupies in no way resembles that of Leicester. The greater portion of Oldham is built on very hilly ground, which affords excellent natural facilities for outfall; and Dr. Sutton the Medical Officer of Health for the Borough, informed me that stagnation is of extremely rare occurrence in any section of the sewers. On the other hand, a great part of Leicester is very flat, some of the sewers of the low-lying areas are

very liable to become silted, and the incidence of the disease was proportionately greater in those localities of the town where this tendency to stagnation is most marked. In what follows I shall endeavour to show that the evils arising from this stagnation and filth accumulation in sewers are, in themselves, sufficient to account for the wide variations in diarrhœal fatality yearly observed among urban populations.

Subsoil Temperature.—Before entering upon the mode of causation of the disease, it is essential that I should briefly draw attention to the change of temperature invariably induced in the subsoil by the meteorological conditions experienced during the spring and summer quarters of the year. The sun is the principal source which imparts to the subsoil of our towns the heat which it possesses. From the vernal equinox, March 21st, until about June 22nd, the days gradually increase in length, and the heat which the soil receives from solar radiation during the days is, speaking generally, greater than it parts with during the nights. The immediate result is a gradual rise during the spring quarter in the temperature of the subsoil and the sewers embedded therein. The temperature in sewers, when these are not sufficiently ventilated, and under ordinary conditions of weather, will be found to have risen from 52° or 54° F., in March to 59° or 62° by the end of June; and if hot, dry weather has prevailed during this latter month, much higher sewer temperatures may be registered at its close. A decided cooling of the sewers and subsoil of towns, as indicated by temperatures below 56°, will not be observed to take place, under ordinary conditions, until about September 25th, *i.e.*, until the period just before the daily receipts of heat from solar radiation begin to fall short of the nightly expenditures. The highest sewer temperature I have ever observed was 69.5° F.; this was taken on the 10th July of last year, when the outer air temperature was 83.5°.

The air of an insufficiently ventilated system of sewers undergoes a daily range of temperature varying from 3° to 12° F. The greatest daily fluctuations take place in the air of main sewers; in these the lowest temperatures occur between 3 and 4 a.m., and the highest between 5 and 6 p.m. The temperature of the air in the sewers of a manufacturing town is never, at any given moment, uniform throughout the system, for, owing to the frequent receipts of heated water from factories and other sources, the temperature in the low-lying main culverts will be found throughout the day to be from 5° to 9° F. higher than that in the subsidiary sewers radiating from such culverts. An exactly opposite relationship with respect to these sewer temperatures will be found to exist during the greater part of the night, for then the temperature of the air in the main culverts is lower than in the tributary sewers. Too great importance cannot, in my opinion, be attached to this unceasing variation in the temperature of the air of town sewers. Owing to this variation, ascending aerial currents are established during the day irrespective of the low specific gravities of some of the component gases; and if, from defective construction, or insufficient fall, any section of the main culverts retains excretal matters and becomes silted, the specific contaminations which such matters contain are thus carried into the remotest branch sewers, though these latter may extend to considerable distances and occupy much higher levels. Stagnation and deposition occurring in a main sewer will thus impart a common noxious character to the air of all its confluents.

Now, when temperatures of 56° F. and over are once established in sewers, putrid fermentation sets in, and the process goes on with a rapidity that is directly proportionate to the increase of temperature attained in the sewer. Sewers in this heated state afford the very conditions (heat, air, and moisture) for the rapid putrefaction of all the putrescible liquids and animal excreta that may be retained in them, for the air of a sewer, if not sufficiently ventilated, is always at the point of complete saturation.

Origin of the Disease.—My observations during the last eighteen months upon the microscopic organisms contained in ordinary air and that of sewers, are much too numerous to mention; I will therefore only draw attention briefly to some of the results, and the conclusions I have drawn therefrom.

1. The moist air in ill-ventilated and non-cleansing sewers, when the temperature of the latter is above 57° F., contains bacteria of the genera micrococcus and bacterium termo, the numbers present being in direct ratio to the increase of temperature from 57° to 69°.5 (the highest temperature observed).

2. The same organisms are to be found in the confined air of cesspools, and here their numbers increase with the atmospheric temperature.

3. The trapping water of all gulley-grates and stench-traps, when connected with sewers of deposit, contains great numbers of both kinds of bacteria, derived in great measure from the air within.

4. During hot weather, and especially when conjoined with great atmospheric dryness, these organisms are given off from all liquids containing them, and are carried into the air in very large numbers by the ascensional force of evaporation. This fact can be easily demonstrated by covering any vessel containing a solution abounding in bacteria with a glass plate. The under surface of the plate becomes covered with watery vapour, which can be collected into drops by the addition of ether, and a subsequent examination discloses the presence of bacteria. These bacteria, as has been before stated, are the active agents in causing putrefaction in putrescible liquids and substances of animal organic origin, and their appearance in the air of sewers and close cesspools is a sure indication that rapid putrefactive changes are going on in the excrementitious matters that may be retained in the former or collected in the latter.

5. In badly sewered districts, milk will be found to be speedily infected with the above ferments; their presence may also be frequently recognised in the stale food of infants, if due care be employed in the collection.

6. The juices that exude from and adhere to the over-ripe fruit exposed in shops or hawked about in such districts will be found, with few exceptions, to contain numbers of bacteria (rods and spherules) moving about amongst cells of the ordinary variety of fruit ferment.

7. The atmosphere of these districts during hot summer weather, when filtered, is always found to yield fungal elements, ranging in character from micrococcus to mycelial filaments. I have never detected the presence of bacteria in the air of the same localities during any day in April or May.

8. For the last two years the commencement of 'summer' diarrhœa in Leicester has been contemporaneous with the appearance, in large numbers, of bacteria in the air of some of its sewers.

The weather conditions of 1878 were more favourable than those of the previous year for the development, multiplication, escape, and subsequent

atmospheric diffusion of these sewer organisms; and these conditions gave rise to a greater prevalence of the disease and a higher fatality.

In a previous part of this paper it was shown that the above organisms were present, in great numbers, in the bowel discharges and vomited matters of patients affected with the complaint under consideration. I therefore consider that (*a*) diarrhœa, as it affects both adults and infants during the summer months, owes its origin, in a great majority of instances, to the introduction of minute living organisms (bacteria) into the system by means of air or in food; and (*b*) the disease depends upon putrefactive changes in the bowel contents, which changes are correlative to the development and multiplication of these microscopical organisms.

Let us now look at a few facts relative to the past and present of other English towns, and ascertain to what degree their experiences lend corroboration to this view of the causation of the disease.

Some twenty-five years ago, very few towns possessed a complete system of drainage, and the means provided for the removal of filth were very inefficient. The habitations of most provincial towns were, at that time, surrounded by heaps of filth and other refuse, which, being allowed to collect in large quantities in open vaults, etc., attracted public attention by a more or less continuous exhalation of offensive stenches arising from putrefaction. The close connection between a filth-contaminated atmosphere and diarrhœa prevalence was, under these conditions, fully recognised, for it almost invariably happened that where high death-rates from the disease were experienced, there also were to be observed proportionate degrees of filth collected around the dwellings of those who had been affected. So frequently were both conditions found to co-exist that Mr. Simon, in his introductory report to Dr. Greenhow's paper, gave special prominence to his conviction with respect to the cause of the disease. While referring to the very unequal prevalence of diarrhœa met with in different towns, Mr. Simon says: 'And any such distribution of diarrhœal disease as has just been noticed warrants a presumption—indeed, so far as I know, a practical certainty—that, in the districts which suffer the high diarrhœal death-rates, the population either breathes or drinks a large amount of putrefying animal refuse.'

All the towns formerly conspicuous for high diarrhœal death-rates have now adopted and carried out various schemes to secure the more rapid removal of their filth, and so prevent its undue accumulation in their midst. The construction of general systems of sewerage supplied the means whereby these towns were enabled in great measure to accomplish this, and in the majority of them, at the present time, the greatest bulk of their excretal matters is immediately discharged through multitudinous openings into the sewers beneath.

On looking over the diarrhœal death-rates, for last summer quarter, of seventy English towns, as given in the Quarterly Report of the Registrar General, it will be observed:

1st. That all those towns, however varied their industries, remarkable for low death-rates, have excellent natural facilities for outfall. If the advantages of site which these towns possess have been at all utilised in the construction of their sewers (and there is every reason to believe that such has been the case), the gradients are sufficient to bestow such a velocity on the sewage flow as either ensures the rapid conveyance and complete removal from beneath the inhabited areas of all the excretal matters daily received by the sewers, or, at most, permit of the least stagnation and retention of such matters during their passage through these channels. The towns occupying such fortunate sites are Plymouth, Bristol, Oldham, Chatham, Hastings, Southampton, Chester, Halifax, and Merthyr-Tydfil.

2nd. That all those towns, however varied their industries, remarkable for high death-rates, occupy sites having a common character, viz.: each area is either uniformly, or, in great part, flat. The facilities for outfall, which their position and surroundings command, are scanty in amount and insufficient to afford such gradients to the sewers as render them self-cleansing. Some of the towns occuping such unfortunate sites are Ipswich, Yarmouth, Cambridge, Leeds, Liverpool, Preston, Wigan, Northampton, Lincoln, St. Helens, Leicester and Hull. After careful inquiry I find that considerable excretal accumulation, resulting from insufficient fall, does actually take place in some of the sewers beneath the sites of all these towns.

I have brought under notice the fact that the subsoil of towns during the second quarter of the year is subject to a rise in temperature, and that, under ordinary seasonal changes, the soil at sewer depths reaches putrefactive temperature towards the end of June or beginning of July. During the active putrefaction of the filth stored up in these underground cesspools, the organisms giving rise to the process are thrown off in enormous numbers from the putrefying mass into the sewer air. The medium at present used to confine sewer gas, viz., water, fails to arrest the outward passage of these minute forms. The bacteria in the sewer air easily pass through the water in ordinary traps, and are lifted into the air by evaporation, and, if the weather conditions favour this latter process, a free communication is soon established between the sewer and the atmosphere around dwellings. The contamination of air by putrefying animal refuse is thus brought about with as great certainty, though in a less degree, as if the excretal matters were stored upon the surface and in close proximity to human habitations.

This view of the causation of diarrhœa in our large towns is, in my opinion, the only one that affords a satisfactory solution to the wide variations of mortality observed amongst their populations. It is, moreover, the one most in harmony with the convictions of Mr. Simon, who may justly be regarded as one of the first sanitarians of the day.

Before concluding I wish to draw attention to an arrangement frequently met with in household construction, which, in localities where the sewers are liable to become silted, contributes powerfully towards the spread of diarrhœa and typhoid fever. The arrangement to which I refer is the position which the sinkstone pipe is made to occupy with respect to the outside trap placed over the sink drain. In the majority of houses, as at present constructed, the outside opening from the sink is immediately over the sink trap, and if the sink pipe be of lead the end of this is bent sharply downwards and the orifice thus brought still nearer the mouth of the trap. Some houses, by no means few in number, instead of a leaden sink pipe, have only a rough channel of brickwork provided for the discharge of the slops, and this passage, by frequent use, is soon much befouled with a coating of grease and other impurities. The outer openings to these brick channels are large and patulous, and formed by chipping an inch or two off the end of one of the bricks forming the outside

wall. These openings are also above and in immediate proximity to the sink trap.

When a tube, in which is fixed a delicate fan suspended on needle points, is placed over the untrapped openings of sinkstones in the sculleries and back kitchens of houses where the above arrangement exists, a current of air (indicated by the revolutions of the fan) will, nearly always, be found to be passing through the sink pipe. The velocity of this current is directly proportionate to the difference between the temperature of the air within and that outside the dwelling, and its direction during the night I have invariably found to be from without inwards.

I have already shown that about the end of June active putrefaction is set up in sewers containing deposit through the rise in temperature the subsoil undergoes at sewer depths. At such seasons the air of these sewers is heavily charged with the products and agents of putrefaction, and the water contained in the traps connected with them requires but a short exposure to afford abundant evidence of impregnation having taken place from within. Traps with water thus contaminated differ in no respect from so many saucers partly filled with diluted sewage undergoing putrefaction, and, when the weather conditions are such as favour rapid evaporation, the air in the immediate neighbourhood of the traps becomes much impregnated with putrefactive elements (bacteria) derived from the dilute sewage contained in these appliances. This air, pregnant with bacteria and other organic impurities, is afterwards sucked into the interior of the houses by the current that is passing up the sink pipe. The air of houses is thus polluted, and all articles of food that may be stored in the sculleries and back kitchens become contaminated. In houses without cellars, very frequent use is made of the scullery shelves, during the heat of summer, to keep milk and other articles of food cool, and when these are inoculated, in the manner described, with the ferments of putrefaction, their ingestion gives rise to a train of symptoms similar in every respect to those so commonly observed to follow the eating of food in a putrid state, viz.: violent sickness, griping, tenesmus, profuse diarrhœa, and the stools swarming with bacteria. The germs also of typhoid fever, in my opinion, more frequently gain admission into artizan habitations through the sink pipes than by any other means. An inspection of the houses where typhoid fever existed during 1878 showed that, in the majority of instances, the water supplied to them was pure in quality, and no apparent defect existed in their sanitary appliances.

BATH, ITS HOT WELLS AND THEIR USES.

By John W. Tripe, M.D.,

Medical Officer of Health and Public Analyst for the Hackney District.

Almost everyone has heard of the tradition of King Bladud's cure, and the consequent renown in early times which these springs obtained; but without going so far back in the history of the city, it is certain that during the Roman domination a large set of apartments was erected contiguous to the temple dedicated to Minerva in this city. In 1755, the ruins of a large bath were found in the vicinity of the springs, occupying an area of 240 feet from east to west, and 120 feet from north to south, when the remains of columns, pilasters, and other ornamental architecture were met with, and a pavement, consisting of highly decorated tiles. The *frigidarium*, where the bathers undressed themselves, the *tepidarium*, which was moderately heated, and used before entering the hot bath, and the *calidarium* were plainly visible, as well as a small room, the *elæothesium*, in which the bathers were anointed after having used the hot bath. In addition to these, the remains of other structures have been found, as well as of numerous villas outside the city walls. Roman coins of Vespasian, Trajan, Alexander Severus, Carausius, Constantine the Great, have also been frequently dug out of the ground.

Bath was occupied by the Romans, as it is now, chiefly as a residential city, and for the cure of the sick, which was continued in the Saxon times, so that it was called by them 'the city of the sick man'. In the seventh century, Osric, King of Gloucestershire, Herefordshire, and Worcestershire, visited it for the sake of its waters, and built a cloister for nuns; and Offa in the next century resided here with his court. In 1106, John de Villula, Bishop of Bath and Wells, built two new baths, one for the use of the public and the other for the monastery, and in 1138 Bishop Robert constructed a new bath, which was set apart for lepers, and was used solely by them for centuries. This bath remained in 1773, and was then but little used, as true leprosy had been gradually disappearing in this country. The population of Bath at the time of the Conquest was probably less than 1,000, as only 178 burgesses possessed houses, and about 1,200 in the time of Charles I, when Queen Henrietta Maria visited Bath for the use of the waters. In 1750, the population was about 9,000, in 1801, it was 34,160, and in 1871, 52,557, showing but a moderate increase since 1801.

The situation of Bath is beautiful, being embosomed in hills, which afford pleasant walks, and a more bracing air than is to be found in the city itself; but it is not for these that visitors chiefly go there, although, doubtless, it has had much to do with inducing so many persons to become residents. The hot wells, of which there are several, are the chief attraction, so that there are four establishments for bathing, in addition to the Hot Bath and the Hetling Pump Room—viz., the King's and Queen's Private Baths, the Royal Private Baths, the Cross Baths, and the New Royal Private Baths, which, as well as the others, belong to the corporation, although it forms a wing of the Grand Hotel. The source of the springs is unknown, but it is probable that they find their way through fissures in the older rocks, and then through the coal measures, sandstones, marls, and other members of the Oolitic series, as pieces of coal have occasionally been ejected from the springs. In connection with this theory, it may be mentioned that Sir Charles Lyell, in his inaugural address at the Bath meeting of the British Association, remarked that 'hot springs frequently occur near the junction of two geological formations; and those of Bath arise near the junction of the Lias with the Upper Oolite'. The source of the springs is probably towards the west, as in 1835 a well 170 feet deep was sunk in that direction, and affected the supply of both the Hot and Cross Baths, which is somewhat noteworthy, as the temperature of the Hot Bath is 120° F., and of the Cross Bath only 104° F. The volume of water discharged daily from the springs is about 180,000 gallons, and appears to be unaffected by rainfall, so that, as described by an old writer, they are neither increased by the greatest rain nor lessened by the greatest drought. The total quantity of water emitted in the year would therefore be about 56,000,000

gallons, which, as shown by analysis, would contain about 3,402 lbs. of solid matter. The constituents of the water of the King's Bath, as shown by Merck and Galloway's analysis, are as follows :—Calcium, 386; magnesium, 54 ; potassium, 29.8 ; sodium, 160 ; iron, 7.4 ; sulphuric acid, 1,029.5 ; carbonic acid (combined), 86.9 ; chlorine, 265.3 ; and silica, 42.6, making a total of 2,062 grains per 1,000,000 grains of water. An analysis of Capt. Mackay Heriot, F.G.S., makes the total only 1,864 grains per 1,000,000, that of the Hetling pump being 1,911.9, and of the Cross Bath 1,913.3 grains per 1,000,000 parts. In addition to these, the water contains a considerable quantity of carbonic acid and nitrogen. The charges are as follows :—At the New Royal Baths (Grand Hotel), for a first class private bath, 2*s.* 6*d.* ; with douche, 3*s.* ; vapour bath, 2*s.* 6*d.* ; ditto, with shower, 3*s.* 6*d.* ; reclining and douche, 2*s.* For a first class swimming bath, the water of which is renewed three times a week, with use of private room for one person, 1*s.* ; two persons, 1*s.* 6*d.* ; and three persons, 2*s.* ; the public room being 6*d.* each. This bath is available for ladies on Monday, Wednesday, and Friday, and for gentlemen on Tuesday, Thursday, and Saturday. The prices at the King's and Queen's Baths are sixpence lower than at the New Royal Baths for each of the private baths, as they are not quite so elaborately fitted, but they are equally as clean and good. In addition to the first-class baths, there are second-class at this establishment at a lower price—viz., 1*s.* for a reclining bath, and 6*d.* for a small reclining bath ; 1*s.* for the public bath, with a private room, and 6*d.* for the public room. At the Royal Baths the charges are the same as at the King's and Queen's Baths, whilst for the accommodation of the poor there is the Cross Bath (temperature 104° F.), at twopence per admission, and one penny extra for a towel if required. In addition to these, there is a tepid swimming bath for gentlemen only at the Royal Baths, at a charge of ninepence with the use of a private room, and sixpence for the public room. I have stated the prices in considerable detail, to show that no person need stay away because of the cost. In addition, I would mention that the rent of apartments and houses, even in the season, is below that of most other health resorts. The afternoon musical entertainments at the Grand Pump Room will assist the invalid in pleasantly passing away his time, from rain, wind, and sun, without causing any undue excitement, which is often injurious to the sick. There is also a free library, which is open from ten to ten daily.

The water supply of the city is good and ample, as it reaches nearly thirty gallons per head even in winter, and is obtained from several springs, having their rise in the adjacent hills, and from the Monkswood, Oakwood, and Eyford springs, and as all these, as well as the works, belong to the corporation, the supply is not likely to be restricted. The total cost was above £126,000.

The mortality in the city seems to be rather high, as the death-rate in 1873 was 24.2 per 1000 population ; in 1874 it was 23.2 ; in 1875, 24.9 ; in 1876, 21.2 ; and in 1877, 21.6 ; giving an average of 23 per 1000 in these five years, or 0.5 per 1000 above that for the population of England and Wales. In the 10 years, 1841-50, the death-rate was 24 per 1000 ; in 1851-60 it was 22 ; and in 1861-70 it was also 22, so that the mortality in 1873-77 was above the mean of the 20 preceding years. If the number of females (40,160) to males (28,803) mentioned in the Supplement to the 35th Annual Report of the Registrar-General as the mean population for 1861-71 be correct, this mortality is higher than the normal rate, unless there be a large proportion of elderly persons, and a considerable number of deaths of visitors. The death-rate amongst children under five years of age was 6.97 per 100 males living at that age, and 5.76 per 100 females, which was about the same proportion as in Hackney (a suburban metropolitan district), where it was 6.83 and 5.89 respectively. The mortality at all ages in Hackney was 19, 19, and 20 per 1000 in each of the 10 years, against 24, 22, and 22 in Bath. These figures, which are taken from the Registrar-General's report, include the deaths and population in the whole of the Bath registration district, part of which is situated outside the city.

The climate of Bath has received much attention, and especially of late, from the Rev. J. Blomefield, who discussed the returns obtained from observations made in the grounds of the Royal Literary and Scientific Institution. From these it appears that the mean fall of rain is about 30 inches per annum, of which 5.492 inches fell in spring, 6.227 inches in summer, 8.892 inches in autumn, and 9.730 inches in winter. The city is described as having an excess of humidity in summer and autumn, as compared with places to the eastward and westward, but a deficiency in winter and spring. The average number of days on which rain fell was 161, and the prevailing winds were from the west and north-west. The mean temperature for the 10 years 1866-75 was 50.5 deg. Fahr., the highest annual mean being 52.0 deg., and the lowest 49.4, giving a range of 2.6 deg. The mean temperature of spring is about 49 degrees, of summer 61.5, of autumn 50.5, and in winter somewhat above that of Greenwich.

The Grand Pump Room, which is near the Abbey Church, is a handsome building, in which performances of music take place in the afternoon during the season, and where the waters are supplied to those requiring them. Attached to the room are the King's and Queen's Baths, the former being 59 feet long, 40 feet in breadth, and about 4 feet 6 inches in depth. The temperature of the spring which bubbles up in the centre is 117 deg. Fahr., but at the sides about 100 deg., so that on entering it is somewhat unpleasantly hot, but becomes enjoyable after a few minutes' immersion. The bath is entered either from a private or the public room by steps, so that the bather can sit on a step up to his neck in water, if he should prefer that to walking about, as swimming is not allowed. After remaining in the water from ten to twenty minutes, or even half an hour, the bather re-enters the room and wraps himself, or is wrapped by the attendant, in a calico sheet and a flannel dressing-gown or blanket, in which he remains for fifteen or twenty minutes, and after thoroughly drying himself and dressing it is advisable to enter the Pump Room so as to cool down thoroughly before going into the open air. These baths may be taken daily, or not so often, according to the directions of the medical attendant, for it is not advisable to take these or any other hot baths for the cure of disease, except under medical advice.

The Queen's Bath, which adjoins the King's, is not quite so hot, being 3 or 4 degrees cooler. In the same building are private baths, in each of which there is a carpet, one or more chairs, a looking-glass, fire-place, etc., even where the price is so low as 6d. or 1s. In the best baths there is also a couch and every requisite for comfort. There are also sitting baths, reclining baths, either with or without a douche apparatus, shower baths, vapour baths, and a dry

pumping or douche bath. This latter is a dry bath in which the patient is seated, when the water is applied to the affected part from a douche, either in a stream, or from a rose. The sitz or sitting baths are entered by descending several steps into a kind of well, in which there are two seats and a douche, the latter being applied by the attendant, under water.

The most powerful of all these baths is the 'dry douche', as it not only acts on the part to which it is applied, but in my own case caused far more profuse perspiration all over the body even than the King's Bath. When first taken, the time should be limited to six or seven minutes, as it acts so powerfully on some persons when applied for a longer time, as to produce blistering or cracking and shrivelling of the skin. The Hot Bath, which was especially described by Leland, is hotter than any other, viz., 120 deg. Fahr., is said to produce at first a scalding sensation, but I did not try it, being quite satisfied with the heat of the King's Bath. I may say that I took the baths for lumbago, and received much benefit after the second bath.

The waters are taken internally, as well as in baths, four or five ounces being usually drank twice a day, but some persons drink much more. They raise the temperature of the body, increase the pulse, and excite the secretions. When taken in small quantities, they have a tendency to produce constipation, but when in large doses, they act as an aperient, as might have been expected from the analyses. If they agree, they cause a sense of warmth in the stomach, an increased appetite, augmented secretion of the saliva and urine, the latter of which is a good sign; but if headache, nausea, a dry tongue, and loss of appetite occur, either the time of drinking the water, or the dose must be altered, or perhaps discontinued. The water should be drank slowly, and not taken at a draught.

Bathing in the waters causes a pleasant feeling of warmth soon after immersion, as well as after the bath has been taken. The pulse becomes quicker and fuller (I found from 6 to 8 beats a minute), and the quantity of urine increased. The bath should be followed by a feeling of greater bodily comfort and a desire to take exercise, rather than by the depression or exhaustion so often succeeding to an ordinary hot bath; indeed, the effects are much like those of a Turkish bath, but are not accompanied by so profuse a perspiration. Having tried both for the cure of gouty rheumatism, I may say that the dry douche at Bath is far more efficacious than a Turkish bath, and I prefer the douche from the rose to that direct from the tube. A temperature of from 95 to 97 is generally recommended, but I must say that I prefer 98 to 100, although it is certainly better that the bath first taken should not exceed the former temperature.

In *rheumatism*, great benefit is usually derived from the waters, especially if taken soon after the acute symptoms have subsided, when the baths are most grateful and accelerate recovery. In subacute rheumatism they are also of great benefit, and in chronic rheumatism much relief, and in many cases recovery, have followed their use. Lumbago, sciatica, and other forms of neuralgic rheumatism are frequently cured, and almost always relieved by the douche; and rheumatic affections of the joints, by a combination of the baths at 100 deg., if they can be borne, and the wet douche.

In cases of *gout* these waters have long been celebrated, and should be used both externally and internally, in consequence of their action on the stomach and kidneys. Latent gout, which causes so many petty miseries, neuralgia, and other ailments that occur in persons of a gouty disposition, but who have never had an acute attack, is sometimes converted into a 'fit of gout'. This is generally followed by recovery. *Anæmia* (want of good red blood) is often removed by the use of the waters internally and externally, as it often depends on *chronic indigestion*, which is amongst the diseases that are most benefited.

As an illustration of the effects on these cases, I cannot do better than give the following quotation from an old author. 'Every medical practitioner at this place (Bath) has seen instances of people labouring under want of appetite, pain, and spasms of stomach and bowels, together with all the other symptoms of depraved digestion and want of power in the proper organs to perform their functions, joined to a very great degree of weakness, both of the body and the spirits, relieved by the use of the Bath waters. The recovery in such cases is particularly remarkable, from its taking place so quickly after commencing the remedy. In a few days the appetite is often restored altogether, the wandering spasm and pain cease, the natural rest returns, and the spirits are raised to their proper pitch. The strength likewise improves daily, and the natural secretions and regularity of the body in point of evacuation are restored.'

In *palsy*, arising from lead, arsenic, mercury, etc., the waters are often beneficial, but rarely in cases of palsy arising from brain or spinal disease. In the early stage of *hip disease* and *chorea* the douche, with or without bathing, is often useful, and many chronic skin diseases, especially when occurring in gouty persons, are frequently cured.

Winter is not the best season of the year for taking the waters, as from variations in the weather the course is often interrupted, and the cure interfered with, so that spring and autumn are preferable, viz., from the end of March to the end of June, and from the end of August to the middle of November. In consequence, however, of the arrangements at the baths, the provision of fireplaces in the rooms, and as regards the King's and Queen's Baths, their contiguity to the Pump Room, where the bathers can gradually cool down, the baths can be taken all the year round. But as exercise in the open air is of great assistance in promoting recovery, it is evident that if the case will admit of waiting, the treatment should in preference be carried out in spring or autumn.

During the year 1877, as many as 475 cases of rheumatism were admitted into the Mineral Water Hospital, of which 63 recovered, 380 were relieved, 1 died, 26 were no better, the remainder being discharged, either as unsuitable or at their own request. There were also 84 cases of sciatica, lumbago, or neuralgia admitted, of which 14 recovered, 63 were relieved, 5 no better, and 2 discharged; also 108 cases of gout, of which 10 recovered, 89 were relieved, 3 no better, and 3 discharged; 20 cases of paralysis, 14 relieved, 3 no better, 3 discharged; 33 cases of lead palsy admitted, 4 recovered, 27 relieved, 2 no better; 4 other cases of palsy, no better; also 38 cases of leprosy, and other skin diseases, of which 12 recovered, 23 were relieved, 1 no better, and 3 discharged. Considering that most of these were chronic cases, and had been previously under treatment, we may fairly conclude that the Bath mineral waters are a remedy of undoubted value. They are also said by many who have tried both to be decidedly more powerful agents in the cure of disease

than the artificially heated waters of Spa and other continental bathing places, and it therefore seems unnecessary to go abroad for the treatment of gout and the other disease just mentioned, when what is required can be obtained at home with less trouble, suffering, and expense.

A PRACTICAL POINT IN DIPHTHERIA-DIFFUSION.

By Arthur Downes, M.D., S.Sc., Cert. Camb.

Notwithstanding a certain *à priori* probability of the occasional dissemination of diphtheria by water, and with due regard to what has hitherto appeared in print on the subject, there is not yet, so far as I am aware, a single indisputable piece of confirmatory evidence upon record. There is, however, a general but misleading and unscientific tendency, by no means confined to the popular mind, to accept the mere existence of drainage defects or polluted water-supply in connection with a diphtheria-invaded house as a final explanation of the outbreak. For examples of this, I need only point to the correspondence columns of this Journal. It is not my intention, however, here to enlarge upon the view which experience in rural districts, from which this disease is never entirely absent, has long led me to entertain, viz., that the *diffusion* of diphtheria in such districts is mainly dependent upon personal infection distributed by mild unrecognised cases, and independent, at any rate, as a general rule, both of water supply and ordinary sanitary defects. I only wish to indicate a common mode of infection and a fallacy which may occasionally, I believe, lead an observer to the erroneous belief that he has to deal with a water-spread epidemic of diphtheria. In the numerous outbreaks which it has been my lot personally to investigate I have never, with the apparent exception below recorded, met with any instances in which (reserving the doubtful possibility of aggravation of virulence in the consumers of impure water) drinking water has played any part. The apparent exception was this. Diphtheria of marked type had occurred on a wet clay upland situated at one end of a long, well-cultivated vale, up which an irregular prevalence of 'colds' and 'sore throats' forthwith slowly crept from hamlet to hamlet. These ailments, generally speaking, presented no specific features by which they could be diagnosed *per se*, but their true nature was revealed by their history and by occasional cases of more pronounced character.

At length illness appeared among the school-children at a village some eight miles up the valley. It was of rather anomalous type—it is my experience that, especially in the milder epidemics, diphtheria by no means confines itself to the lines laid down in the text-books—some of the cases were called 'gastric fever', one or two 'scarlatina', one, on account of a curious rash, was thought to be 'measles'* by an experienced old nurse, but others were sufficiently characteristic to indicate their real nature. The only condition common to those attacked was their attendance at the village school. Their homes were widely scattered. Now, at one side of the playground was a small dip-well, liable to occasional road-washings, but not to serious contamination, much used by the children and by several houses in the village. To this well popular opinion attributed the spread of the disease, and with popular opinion, though in a different way, I came to agree.

A frequent, perhaps the most frequent, mode of transference of the diphtheritic *contagium* from person to person is the use in common of drinking vessels, spoons, etc. Attached by a chain to the well in question was a metal cup for the use of the children, and to this cup I incline to attribute the spread of the infection. That the water had nothing to do with it may be inferred from its character and from the immunity of households in the village using it. The infection may of course have been spread by mere proximity of child to child in school, or by kissing. I am not prepared to deny this, but, considering the peculiar facility for transmission of diphtheria virus by drinking-vessels, and the fact, *quantum valeat*, that the schoolmaster's family, who mixed with the children, but did not, I was informed, use the cup, escaped, I think the explanation I have given a very probable one.

I believe, indeed, that the actual medium of infection among school-children is very commonly some spout or drinking-vessel to which they apply their mouths one after another. Those who come from a distance are frequently in the habit, also, especially when water is not readily procurable, of bringing tea, etc., in bottles with them; these they pass to each other, and with community of bottle often comes, I have no doubt, community of diphtheria. My chief purpose, however, is to direct attention to a practical point in connection with diphtheria-diffusion, which may occasionally simulate water-dissemination, about which a great deal is just now being written or said.

* A relative, who has practised for forty years in a locality frequently visited by diphtheria, informs me that a measles-like eruption in certain cases of that disease is well known to him, and I have investigated other outbreaks in which a similar rash has been stated to have occurred. The various phases of diphtheria are not yet sufficiently appreciated by the medical profession.

THE REGISTRAR-GENERAL'S QUARTERLY RETURN.

Among the more salient features of the general vital statistics dealt with by the Registrar-General, in his Quarterly Return, just issued, the following call for brief notice, before passing on to note in greater detail the mortality statistics, and to consider what evidence they afford of the condition of the public health in the second quarter of this year.

The depression in the marriage-rate, that unerring test of the material condition and prospects of the people, was still more strongly marked during the first quarter of this year, than it had been in any of the four quarters of 1878. The annual marriage-rate, in the three months ending March last, did not exceed 11.6 per 1,000, and was 2.1 below the average rate in the corresponding period of the 40 years—1838-77. So low a marriage-rate has not prevailed in the first quarter of any year since 1837, when the Act for civil registration of marriages, births, and deaths first rendered these statistics possible. The nearest approach to so low a marriage-rate, in the first quarter of the year, was 12.5 in the first three months of 1841. Board of Trade Returns show a marked increase in the numbers of emigrants from the United Kingdom during the three months ending June last; the increase upon the number returned in the corresponding period of 1878 was equal to 53 per cent. Pauperism also continues to increase; the number of in-door and out-door paupers relieved

in England and Wales last quarter, showed an increase of 6.2 per cent. upon that in the second quarter of 1878. The proportion of in-door and out-door paupers, however, did not exceed 28.9 per 1,000 of the population last quarter, whereas it was equal to 43.1 per 1,000 in the corresponding quarter of 1870. The mean wholesale prices of wheat, and of meat, were higher than in the first quarter of the year, but wheat was cheaper than in the second quarter of any year since 1865. The price of coal still keeps remarkably low. The meteorology of the quarter was remarkable for low temperature, absence of sunshine, and abundant rains. The mean temperature of the air, at the Royal Observatory, Greenwich, was only 49.5°, 2.8° below the average for the corresponding period of 108 years, and lower than in the second quarter of any year since 1837. The temperature of May showed the largest deficiency. Rain was measured on 51 of the 91 days of the quarter, to the aggregate amount of 10.3 inches, showing an excess of 4.5 inches upon the average for the corresponding quarter in 64 years; the largest excess occurred in June. The rainfall of the first six months of this year amounted to 17.3 inches, and was, without a single exception, larger than in any corresponding six months since 1815. The recorded hours of bright sunshine in the quarter were 352, against 486 and 500 in the second quarters of 1877 and 1878.

The birth-rate in England and Wales, as a natural result of the now long depressed marriage rate, has fallen below the average. In the three months ending June last the annual rate was equal to only 35.2, against 37.4, 36.5, and 36.9 in the corresponding periods of 1876, 1877, 1878; it was lower than in any June quarter since 1869, and was 1.0 below the average rate in the second quarter of the ten years 1869-78. In the different English counties the birth-rate last quarter ranged from 26.3 and 27.8 in Westmorland and Cornwall, to 40.7 in Derbyshire and 40.9 in Staffordshire. In twenty of the largest English towns the birth-rate averaged 35.9, against 37.8 in the second quarter of 1878. The lowest rates in these towns were 29.1 in Plymouth, 31.2 in Brighton, and 31.3 in Portsmouth; the highest rates were 40.5 in Birmingham and 40.8 both in Hull and in Sunderland. In fifty other large town-districts the birth-rate averaged 35.8, and ranged from 22.2 and 25.2 in Bath and Cheltenham, to 44.8 in Barrow-in-Furness, 45.4 in St. Helens, and 48.8 in Wigan. These marked variations in the local recorded urban birth-rates are mainly due to the varying proportion of married women living at the child-bearing ages in the different populations.

Cold, wet, and unseasonable weather prevailed for the most part throughout the three months ending June, and, judged by the weekly returns from twenty of the largest English towns, which contain nearly a third of the entire population of England and Wales, the rate of mortality exceeded the average during April and the greater part of May, but fell below the average during June. The 132,186 deaths registered during the quarter were equal to an annual rate of 21.1 per 1,000 of the estimated population, which was almost identical with the average rate in the two preceeding corresponding quarters. The death-rate among males was equal to 22.6, and among females to 19.6 per 1,000 living of each sex; the relative proportion of male and of female mortality corresponded with the average proportion in the second quarter of the year. In the several English counties the death-rate last quarter ranged upwards from 16.7 in the extra-metropolitan portion of Surrey and 17.4 in Westmorland, to 23.5 in Lancashire, 23.7 in Derbyshire, and 25.3 in Herefordshire. The excess of mortality in the three last-mentioned counties was in great measure due to the fatality of zymotic diseases.

In the principal urban population of England and Wales, the death-rate last quarter was equal to 21.6 per 1000, while in the remaining or rural population it did not exceed 20.3. While the urban rate was 0.9 below, the rural rate was as much above, the average rates in the corresponding quarters. The cold and wet spring appears therefore to have exercised a more fatal influence upon rural than upon urban populations. In twenty of the largest English towns the death-rate averaged 22.2 per 1000, against 23.3 and 22.7 in the corresponding quarters of 1877 and 1878. The lowest rates in these towns were 15.8 in Portsmouth, 18.0 in Brighton, and 19.9 in Leicester. In the other towns the rates ranged upwards to 23.6 in Liverpool, 25.4 in Newcastle-upon-Tyne, and 25.8 in Manchester. Manchester, judged by its death-rate, has now for some time held the position, so long occupied by Liverpool, of the most unhealthy large English town. In fifty other large English and Welsh town districts, the average death-rate was 21.1 per 1000, and ranged from 15.1 and 15.9 in Yarmouth and Dover, to 25.7 in Preston, 26.7 in Derby, 27.0 in Ashton-under-Lyne, and 27.7 in St. Helens. The high rates in Derby and St. Helens were almost entirely due to the epidemic fatality of scarlet fever and of measles respectively.

The Registrar-General's Quarterly Return only distinguishes the deaths of infants under one year of age, and those of persons aged upwards of sixty years. This enables us to consider the mortality at three groups of ages. The deaths of infants under one year of age were equal to 131 per 1000 of the births registered, which was slightly below the average proportion in the nine preceding corresponding quarters. While the rate of infant mortality did not exceed 102 per 1000 in Sussex and Essex, it was equal to 165 in Buckinghamshire, and 169 in Leicestershire. The infant death-rate in the twenty large towns averaged 141 per 1000, and ranged from 93 and 120 in Portsmouth and Brighton, to 158 in Manchester and Oldham, and 197 in Leicester. In the fifty other towns infant mortality averaged 140 per 1000; it was but 70 in Dover and 83 in Southampton, while it was 177 in Worcester, 179 in Bolton, 182 in West Bromwich, and 207 in Huddersfield. Worcester and Bolton are old offenders in the way of excessive infant mortality. The rate of mortality among children and adults aged between one and sixty years was equal to 11.9 per 1000 estimated to be living at those ages, against 12.5, the average rate in the nine preceding corresponding quarters; in the twenty towns it averaged 13.7, and ranged from 9.9 and 10.1 in Leicester and Brighton, to 15.6 and 16.9 in Liverpool and Manchester. Among persons aged upwards of sixty years the annual death-rate was equal to 78.1 per 1000 last quarter, and exceeded the average by 8.3; indeed, the death-rate among elderly persons was considerably higher during last quarter than in any of the nine preceding spring quarters on record. In the twenty towns the average death-rate at these ages but slightly exceeded the general English rate; it ranged from 61.5 and 62.3 in Leicester and Portsmouth, to 108.1 and 109.1 in Newcastle-upon-Tyne and Wolverhampton. Compared with the average rates in the nine preceding spring quarters, the mortality in the three months ending June last, among persons aged under sixty years, was 4.1

per cent. below, while among persons aged upwards of sixty years it showed an excess of 11.9 per cent.

From the excessive death-rate among elderly persons, and with the aid of the weekly returns for London and a few other large towns which afford the necessary information, it may be confidently asserted that the mortality from diseases of the respiratory organs showed a considerable excess last quarter. It appears to have been balanced by the comparatively low mortality from zymotic diseases. During the quarter 13,490, or 10.2 per cent. of the deaths from all causes were referred to the seven principal zymotic diseases, equal to an annual rate of 2.15 per 1,000 living; the average death-rate from these diseases in the corresponding quarters of the nine preceding years was 2.85 per 1,000. The zymotic death-rate was only 0.91 and 0.93 in the counties of Sussex and Westmorland, whereas it was equal to 3.00 in Lancashire, 3.25 in Northumberland, and 3.31 in Derbyshire. In the twenty large towns this zymotic fatality was equal to 12.4 per cent. of the total deaths, and to a rate of 2.8 per 1000; it was so low as 0.9 and 1.3 in Portsmouth and Brighton, whereas it was equal to 3.2 in Manchester, Salford, and Sheffield, and to 4.0 in Newcastle-upon-Tyne. The zymotic death-rate in the fifty towns was so low as 0.2 in Hastings, 0.4 in Southampton, 0.5 in Cambridge, and 0.6 in Oxford; whereas it was equal to 5.0 in Barrow-in-Furness, 5.3 in Chester, 6.4 in Derby, and 9.7 in St. Helens. Scarlet fever was fatally epidemic in Derby, and measles in Barrow-in-Furness, Chester, and St. Helens. In England and Wales, exclusive of the seventy towns, the death-rate from those seven diseases was but 1.83 per 1,000; zymotic fatality last quarter was therefore more than 40 per cent. greater in the seventy towns than in the rest of England and Wales.

Scarlet fever was the most fatal of the seven zymotic diseases last quarter, although the deaths therefrom showed a further decline from the numbers in the two preceding quarters; the annual death-rate was equal to 0.58 per 1,000 in England and Wales, against 0.62, the average rate in the nine preceding corresponding quarters. The rate from this disease did not exceed 0.11 and 0.12 in Northamptonshire and Sussex, while it was equal to 1.12 in Lancashire, 1.30 in Durham, 1.62 in Northumberland, and 1.64 in Derbyshire. In the twenty large towns, the rate exceeded one per 1,000 in Liverpool, Sheffield, Nottingham, Leeds, Oldham, and Newcastle-upon-Tyne; the disease was also fatally epidemic in Preston, West Bromwich, Walsall, Derby, Eastbourne, Lowestoft, Chorley, and Durham.

The fatality of whooping-cough was also slightly below the average; it was, however, fatally prevalent in Sheffield, Birmingham, Bolton, Manchester, Ramsgate, and Hereford. The annual death-rate from measles was equal to 0.35 per 1,000, while in the nine previous corresponding quarters it had averaged 0.42. Among the seventy large towns the fatality of measles showed a marked excess in Salford, Derby, Huddersfield, Norwich, Reading, Barrow-in-Furness, Chester, and St. Helens. The rate of mortality from fever (including typhus, enteric, or typhoid, and simple continued fever) continues to show a marked decline, and did not exceed 0.29 per 1,000, whereas in the second or spring quarters of the nine years 1870-78 it had averaged 0.47. The death-rate from fever last quarter was no less than 54 per cent. below that which prevailed in the corresponding period of 1870, since which it has steadily declined. In the twenty large towns the death-rate from fever was 0.25, and slightly below the general English rate; it was but 0.04 and 0.10 in Brighton and Leicester, whereas it ranged upward to 0.40 in Portsmouth, 0.41 in Salford, and 0.42 both in Norwich and Liverpool. The death-rate from fever in the fifty other large towns exceeded that in the twenty larger towns by nearly a third, and showed the largest excess in Birkenhead, Carlisle, Lincoln, and Shrewsbury. Fever was also fatally prevalent in Folkestone, Doncaster, and Durham.

The deaths referred to diarrhœa were considerably below the average, owing probably to the unseasonably cold and wet weather that prevailed throughout the quarter. Diphtheria fatality slightly exceeded the average, and showed a larger excess in the Welsh and Metropolitan than in the other registration divisions. The death-rate from diphtheria in the twenty large towns considerably exceeded that which prevailed in the rest of England and Wales.

The fatal cases of small-pox, which had been 243 in the preceding three months, declined to 164 last quarter, of which no less than 147 occurred in London and its outer ring of suburban districts, while no fatal case was recorded in any of the sixty-nine large provincial towns. Of the 17 fatal cases recorded in England and Wales, exclusive of the Metropolitan district, two were returned in Weedon, two in Southam, and three in Batley registration sub-districts. Judged from the returns from the Metropolitan Asylum Hospitals the prevalence of small-pox in London has steadily declined since the beginning of the year; small-pox patients in these hospitals, which had been 353 on 22nd February last, have since decreased to 108 on 2nd inst.

The Registrar-General's Quarterly Return contains the usual mortality statistics for the principal Watering Places and inland Health Resorts, relating to the three months ending June last. These for the most part afford satisfactory evidence of sanitary condition, although Lowestoft, Leamington, Whitby, and Rhyl show high death-rates from zymotic diseases, mainly the result of scarlet fever fatality.

It is satisfactory to find that the proportion of uncertified causes of death continues to decline, though slowly; it is noted, however, that in 4.6 per cent. of the deaths registered no scientific evidence of the cause of death, either from a registered medical practitioner or a coroner, was furnished to the registrar for entry in the national Death Register.

But for the excessive mortality among elderly persons, principally from diseases of the respiratory organs, the mortality statistics for last quarter would afford fairly satisfactory evidence of the public health during the three months ending June last. The zymotic fatality was considerably below the average, and the deaths referred to fever and small-pox were unusually few. The relative excess of mortality in large towns continues to decrease, and there can be no question that if the sanitary organisation of the smaller towns and of the rural districts could be infused with greater vitality, the general death-rate in England and Wales would soon show a marked decrease.

At Barton Green, Hertfordshire, three men have lost their lives through descending a well which had become polluted with sewage matter. Typhoid fever had been prevalent in the place for some time, and the deceased had been engaged to cleanse the well.

DISTRICTS OF MEDICAL OFFICERS OF HEALTH.

By J. Lloyd Roberts, M.B.

Medical Officer of Health, Denbigh.

A comparison of the different experiences of Sanitary Authorities in the working of the Public Health Acts of 1872 and 1875 would be of incalculable advantage in determining the question of the best sort of medical supervision of the public health; but the materials for any such comparison do not at present exist. The six years during which these appointments have been in operation is a sufficient period in which to prove the sanitary organisations of the country, and, on the results, to base an opinion as to what areas are, or may be, with the greatest advantage, included in these organisations; and it is to be hoped that government inquiry into the subject will be made without delay.

Summarised, the object of the work of a Medical Officer of Health is, by a study of the natural history of disease, and by investigating the causes of disease, to give such instructions and advice as may place the community in those conditions of life in which all that is inimical to health and strength may be remote; and by directing the operations of a Sanitary Authority, to so regulate the surroundings of dwellings and the processes of industries, that such circumstances as favour the origin and spread of disease or the depreciation of the health and labour-power of the working classes may be removed. In the exercise of his office a special knowledge is necessary to an officer of health. Besides the ordinary or professional knowledge required by the physician in the diagnosis and treatment of disease, the etiology of disease is to him a special study. To this end the allied sciences of chemistry, engineering, and meteorology have constantly to be appealed to; and that he may rightly administer the instructions he gives, he has to be conversant with the legal enactments which pertain to his office. Statistical methods have to be made use of in expressing results, and the value of the figures so arrived at must be correctly interpreted and rightly understood. Theoretically his function is the same under a small as under a large sanitary authority, or conjoint board. Practically, appreciation of the office is in ratio with the size of the authority and the amount of the salary. It is but natural that the holder of such an appointment, being engaged in private practice, should so contrive his work, and pay most attention to that source of his livelihood which is surest and most remunerative. Under small authorities, and at small salaries, the medical officer of health is apt to be regarded as a superior inspector of nuisances, and generally his work is limited to the inspections which are referred to him by the authorities.

When an officer of health's entire services are retained he is placed in a position of independence, and one in which he can act with authority. Being freed from the cares and anxieties of private practice, with the attendant obligations, he is enabled to devote himself with assiduity to the responsibilities of the office; and with the abundant material for study, and the vast experience which a large sanitary district affords—which a small district does not—opportunities are provided for the advancement of our knowledge of hygiene. Certainly this same material is to be found in the small areas which are the component parts of a large area, yet it is in such varied forms and so scattered that it cannot, if collected, be utilised, and so by sub-division becomes lost.

When Local Boards were constituted Sanitary Authorities, it is to be regretted that the Local Government Board did not promulgate more definite ideas of what the functions of a medical officer of health should be, than those that are foreshadowed in the general order of November 11th, 1872; and the various powers which the Public Health enactment confer upon him. The experience of the past few years shows the diverse interpretations and the varied appreciations of the responsibilities of this office, by a comparison of the remunerations attached to the appointments, and the results which have attended them. In some instances the appointment has been made where the officer most satisfactorily performs his duty by keeping silent as to the condition of his district; in others he has become a scape-goat, either by work done or left undone; and in others, again, he has done good and honest work for an inadequate remuneration. As already stated, small sanitary authorities are too prone to employ the time of their medical officers of health in making inspections. I take it that it is hardly the intention of the legislature that such valuable time should be occupied in work which a reasonably competent inspector of nuisances is equally able to conduct; but rather that, with a knowledge of his district and its requirements, and a staff of inspectors under his control, he should advise the sanitary authority as to such measures as may be devised to maintain a standard of sanitation in his district.

At this time Sanitary Authorities are independent; some with permissive powers of placing themselves under the guidance of the Local Government Board, all with the permissive powers of combining for the purpose of appointing a medical officer of health. In Denbighshire combination did not find favour, though in neighbouring counties, as Cheshire, Shropshire, Montgomeryshire, and Carnarvonshire, combinations have been effected. From representatives of these or other combinations of authorities, the result of their experience of the work done by combination would be interesting.

In 1875 a return containing 'Reports of Local Government Board Inspectors on the working of the Public Health Act, 1872', was published by order of the House of Commons. From these I venture to quote what appear to be the expressed opinions of some of the gentlemen reporting:— Mr. Doyle's (No. 8 District) proposal was, 'to appoint the medical officers of unions as medical officers of health, each for his own district, and inspectors of nuisances each for one union; and, in addition to these, a superintending or consultative officer for each of the four districts into which Wales and Monmouthshire were to be divided'. Mr. Uvedale Corbett (No. 7 District, Lancashire, Cheshire, etc.), says, 'That until powers are obtained to form medical health districts in the same way as audit districts are formed, it will be impossible to inaugurate, especially in districts where small local boards abound, any uniformity of administration on the basis of employing only independent and sufficiently remunerated medical officers of health over considerable areas.' Mr. R. B. Cane (of No. 10 District) says that, 'It seemed to him desirable to obtain the appointment of medical officers of health for districts comprising so many urban and rural authorities, with such an amount of property and extent of area as would engage the whole time of such officers; whilst the amount of salaries, though comparatively

small as regards particular contributions, would, in the aggregate, afford a full and adequate remuneration to medical men possessing the requisite qualifications, and induce them readily to devote their whole time to the duties of the office.' Mr. J. J. Henley (No. 2 District) says, 'The project of grouping several adjacent sanitary areas under one highly qualified and adequately paid health officer seems to present the greatest administrative advantages. The object being to secure a staff of medical men possessed of the highest professional training, and with a special aptitude for sanitary questions, devoting their whole time and energies, from a position of assured independence, to the work of sanitary reform over areas not too large for personal supervision, nor too small to justify an adequate remuneration.'—These opinions might be multiplied, though it is but right that I should add that some few of the gentlemen reporting hold views contrary to what is here expressed.

From the foregoing it will be inferred that the office of medical officer of health is exercised to the best advantage when over a large district and a large population, and that for these reasons: — (1) That sanitary science, or state medicine, being a special branch of medicine, the medical officer of health, by devoting himself entirely to it, is more competent, and is enabled to give a more valuable opinion than when otherwise situated. (2) That his extensive experience, observation, and work may advance our knowledge of etiology and hygiene, and so become of greater value in furthering the welfare of the state. (3) That only by the position of authority, which such an appointment necessitates, can that independence of action be exercised which is so indispensable to the faithful performance of all public duties.

Having so far briefly discussed the appointment of medical officer of health, I wish, in conclusion, to sketch out a new basis of sanitary organisation to that which now prevails; and a combination of existing offices which might, with advantage to each, be included in this office. Already, to a limited extent, are these brought within the observation of the medical officer of health; but as there are other functionaries to these offices, he is left with no authority over them. By centring in one officer the duties of the offices about to be named, a greater efficiency would result in the objects which they are designed to obtain; and by amalgamating the existing remunerations a great economy would be effected, for the sums paid to the various officers holding these appointments would collectively amount to a handsome salary for one officer, without further assistance from rates.

And, first, of the medical officer of health. Being appointed to a large district, his status would be best defined by his occupying a relative position in the sanitary organisation to the chief constable in the police. The authority of directing the minor sanitary operations, such as the suppression of nuisances, etc., would be vested in him, and that there may be unanimity in the work, in compliance with the instructions he gives, the appointment of the subordinate officers should be made by him. The subordinate officers would be sanitary inspectors or superintendents, corresponding to the superintendents of police, appointed to the charge of large sections of the district; these having under them, for defined areas, a sufficient number of sanitary officers or inspectors of nuisances, corresponding to the police officer. Up to this time inspectors of nuisances have been appointed from various classes of society, according to the remunerations attached to the appointments, with varying aptitudes for the duties of the office. Thus some appointments are held by civil engineers, whose capacity for the work is far in excess of what is requisite; whilst others are held by men in no way skilled in sanitation, or whose perceptions of what is offensive and prejudical to health have been blunted by long habits of endurance. The acquirements of the proposed sanitary inspector would be that, besides having a general knowledge of the literature of hygiene and the Public Health Acts, he should at least be able to lay out an ordinary system of drainage or water supply; and of the proposed sanitary officer, that he should be capable of intelligently receiving and carrying out instructions. Such men as surveyors would be most eligible for the post of sanitary inspector; whilst the sanitary officer would be best appointed from such disciplined classes as have had some personal care bestowed upon them, and have thus learned to appreciate the rudiments of sanitation,—as army pensioners, reserve men, or police constables. In this organisation the respective officers would have work allotted them, and remuneration according to their competency, and according to their station in life.

Then of the allied offices which it is proposed to combine with that of the medical officer of health, the (I) first is that of the 'Certifying Factory Surgeon'. This is but an extension of the powers contained in the Public Health Act, and would be but to bring under the immediate observation and authority of the medical officer of health what he has already to take cognisance of in investigating the predispositions to disease. Though embracing so much, it is but a short step from the position of the medical officer of health in regard to trades, as defined in section 91 of the Public Health Act (1875). Sub-section 6 has it, 'That any factory, workshop, or workplace (not already under the operation of any general Act for the regulation of factories or bakehouses) not cleanly kept or properly ventilated, or over-crowded, is deemed to be a nuisance.' As the Medical Officer of Health has to deal with the whole population, all dwellings, and some factories, it seems but little that he should have all factories placed under his supervision. And, indeed, it appears rather a redundancy that two officers having the same end in view should hold office under different authorities.

(II.) The second office is that of 'Superintendent Registrar of Births and Deaths'. Copies of the district registrar's entries of deaths, with numerical extracts from the register of births, are periodically sent to medical officers of health; and these are utilised by them in statistics, both in giving expression to the salubrity of districts and in ascertaining the prevalence of diseases. Superintendent registrars are not called upon to draw up such statistics or materially to deal with the information their registers afford. Such work is obviously best done by the medical statistician, and of this no brighter example can be quoted than that of the distinguished statist, Dr. Farr, of the Registrar General's Department.

(III.) The third is that of the office of Coroner, or rather, I should put it, that a process of inquiry, similar to that conducted by the procurator fiscal in Scotland, might be instituted under the control of the medical officer of health, to supersede this expensive and cumbersome court. This court, the most ancient in the realm, has for its object the discovery of the cause of death, and has thus doubtless afforded protection to life, and thwarted many an act of violence.

In meting justice, it works, it may be said, in duplicate with another equally efficient and more expeditious court; but, like this, is set in motion only by some aggrieved person, or a chance information. In later years the systems of registrations of deaths and burials have been designed to extend this same protection to life. These apply most rigidly where they are least needed; that is, where medical certificates attest the causes of death. And for the rest the coroner's court fails to make good what is here wanting, which it should do were the systems of registration perfect. This may perhaps be better understood by such instances as these, in which it will be recognised that a large number of deaths take place with no cause attested, amongst which grounds of suspicion of violence or neglect may be looked for. In London about 2 per cent. of the deaths registered are not certified. In a sanitary district adjoining this about 25 per cent. of the deaths are unattested; the coroner's certificate being given on about 2 per cent. only of those certified—and I do not think that these figures are exceptional. Some of those uncertified are cases of people dying of old age or long standing and incurable diseases; others of those dying under the hands of druggists or other unlicensed and irregular professors of the healing art. Nor is it to be supposed that there are grounds for suspicion in all or any of these uncertified cases. Yet I do feel most assured that a more rigid system of certification and inquiry would lessen the death-rate, especially amongst those dying under unskilful treatment, and amongst infants and illegitimate children.

It being noted that the Registration Acts and the Coroner's court fail in reaching those deaths concerning which information is most needed, an inquiry, such as is proposed, would be instituted by or under the direction of the medical officer of health into the cause of death in all cases in which no medical certificate attests the cause.

In drawing up these remarks, I feel that I have done but meagre justice to the importance which the subject commands. At the same time, that I have endeavoured to show how sanitary organisation may be best adapted to the preservation of health, and to fostering the vitality and labour power of the community, I have included with this that which is collateral and almost inseparable from it. With the insight that six years has given into sanitary organisation I am further indebted to the writings of others, both on this subject and on the office of medico-legal functionaries in this and continental countries. Much of what is now an old tale is retold, and has been rearranged with other matter in the suggestions sketched out in the present paper.

At the recent meeting of the governors of the Chelsea Hospital for Women, the Earl of St. Germans (the President) received at the hands of the Rev. Canon Fleming (one of the Board of Management) an anonymous donation of £1,000 towards providing furniture for the new hospital. In the spirit of true charity it is given on the express condition 'that no name is mentioned', it being simply acknowledged as 'From a Friend per Rev. Canon Fleming'. We know not which to admire the more, the munificence of the gift, or the manner of bestowment.

The Birkenhead Town Council have decided to erect public baths at some suitable part of the borough for the accommodation of the working classes. The expense, it is understood, will not exceed £2,000.

THE
SANITARY RECORD.
AUGUST 15, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

SEWAGE POLLUTION.

AN action was tried at the Hertford Assizes, which is of much interest to both private persons and Local Boards of Health. It was an action by Mr. Littler, Q.C., against the Edmonton Local Board, to recover damages for the pollution of the ornamental lakes in his park, near Edmonton, by reason of the escape of sewage from the public sewer which runs along a road adjoining his property. It was, it is believed, the first case of the kind tried, and involved many points, which occupied the whole time of Justice Baggallay for the three days he sat.

From the evidence of Mr. Littler, Q.C., it appeared that when he first purchased the estate, the lakes and fish ponds were free from impurity, beyond that derived from ordinary vegetation. Shortly after he came to reside on this property, the Local Board of Edmonton constructed a system of sewerage, and since that time complaints have been made of the lakes smelling, fish dying, etc. In the spring of the present year he called in Mr. Henry Robinson, C.E., to investigate the matter, who came to the conclusion that the lakes were polluted by sewage, and that the cause was a leakage in the sewer at some point or other, and he indicated a probable one, which turned out to be correct. This appears to have been constructed in a curiously defective way, inasmuch as the main sewer was carried (to avoid an old tree trunk drain) in the form of a dip or syphon; and, to further confirm this engineer's opinion, the sewer had at the same point a contraction due to the insertion of a length of smaller sewer. Analysis of the water in the nearest lake, by Professor Wanklyn, confirmed this view, and Mr. Littler was advised to have the lakes all cleaned out.

The action brought against the Local Board was for the cost of clearing out the lakes, and for the expenses incurred in connection therewith. The Board, after Mr. Robinson's inspection, had remedied the defects he pointed out, and had agreed to refer the damages to the arbitration of their Surveyor and Mr. Robinson, but in the end they rejected this, and denied (1st) that the lakes had been polluted with sewage; (2nd) that if they were, it had not been derived from their sewers; and (3rd) that if it had been, it was from no neglect of theirs, inasmuch as the sewers had been constructed by a competent contractor, under an engineer's supervision, in the usual way.

The evidence to sustain and rebut the case against the Board was of great length, and included that of several of the leading engineers and chemists, but the case really lay in a small compass; and although a great conflict of opinion arose as to many points, the Judge, in summing up for the jury, stated that the facts brought forward by Mr. Robinson had not been disproved in his cross-examination, and that even the Surveyor to the Board had made admissions which confirmed them, and beyond that the several theories set up on behalf of the Board were not incapable of being reconciled with them. In the end the jury gave a verdict for Mr. Littler, with £350 damages.

The point of importance to Local Boards is, that a system of sewerage requires to be carried out with exceeding care, and under the best possible advice and supervision. If this is not kept in view, the sewers may become a source of danger from the pollution of the subsoil, and the attendant risk of injury to health. They would also entail a permanent expense, either for repairs, or to meet claims for compensation, such as the one referred to. It was held, in this action, that the Board was liable for the defects in its sewers, although the Board may not have exhibited negligence in its arrangements for carrying out the works, or benefited pecuniarily by the inferior work.

The sanitary aspect of this case also deserves attention. The plaintiff had to leave his house, and reside away for many weeks during the time the defects were being rectified. Many people, however, could not have done this, and would have had to live through the whole trouble, with the risk of having either temporary or permanent injury to health. Too great stress, therefore, cannot be laid on the absolute necessity of Local Boards observing the greatest care in the execution of sewerage works, as no trifling economy at the outset can ever repay either the Board or the ratepayers, for the irreparable harm occasioned by defective work. Even when it is put right, the pollution arising from leaks may have spread beyond the possibility of being remedied. Perhaps the knowledge that a heavy pecuniary payment, in the shape of compensation for the consequence of false economy, may help to impress the sanitary view of the matter on the minds of Local Boards.

THE VITAL STATISTICS OF ISLINGTON.

A DISTRICT in which some 5,000 deaths occur annually is one which necessarily demands an amount of sustained and careful attention, of which those unacquainted with the details of sanitary work can form no conception. The report which Dr. Meymott Tidy has recently presented to the Vestry of St. Mary, Islington, on the health of the district during the years 1876 and 1877, shows clearly enough the ceaseless vigilance which is necessary on the part of the health officer of a large London parish, if he would exercise adequate supervision over his district. And when, in addition to these responsibilities, are superadded the analyses which, as Public Analyst, Dr. Tidy is required to make under the Sale of Food and Drugs Act, as well as those of the London water supply which he makes for the Society of Medical Officers of Health, it may well be wondered how he finds it possible to get through so much work as he does. The present report is very full and complete, and the only fault that we have to find with it is its want of arrangement, which militates seriously against its satisfactory perusal. Facts are given for periods which do not correspond with other periods in the report, and generally it is not easy to gather the precise bearing of the statistics for the two years of which the report professes to treat. We have had occasion before to comment on the loose way in which reports intended to be for particular periods are arranged as regards their statistics, and we cannot too strongly urge upon health officers the importance for permanent purposes of confining their reports to the particular periods under consideration.

In the two years 1876 and 1877, the number of marriages in Islington was almost identically the same, being 2,187 in 1876 and 2,188 in 1877. The birth rates (36·3 and 35·6 per 1,000 of the population) approximated somewhat closely to that for England generally. There was only a small difference between the number of deaths in each year, the rate in 1876 being 18·9 and in 1877 18·5 per 1,000. Of the 4,789 deaths in 1876, 1,397 were of infants under one year of age, and 1,034 were from zymotic diseases. In 1877, 1,302 of the 4,838 deaths were those of infants, and 1,026 were from zymotic causes. During the two years 120 deaths occurred from small-pox; and perhaps the most interesting part of the report is the account of the steps taken to check the spread of the disease, from its outbreak in September 1876, to its disappearance in September 1878. It would be impossible for us to give any sort of summary of this action, even if it were presented to us in a less fragmentary manner than it is in the report; but it may be stated that no less a sum than £392 was expended by the Vestry during the two years of the epidemic for replacing and disinfecting infected beds and bedding.

The details of sanitary work given in Dr. Tidy's full and elaborate tables show that the health officials are very energetic in the performance of their duties, but the facts are of scarcely sufficient general interest to be reproduced here. A graphic account is given of the unsatisfactory nature of the dusting of the parish by contractors, and of the immense improvement which has taken place since it has been undertaken by the Vestry themselves. The system which prevails in London of letting out the dusting to contractors is, we believe, universally condemned by medical officers of health, as well as execrated by householders. The difficulties in the way of getting the contents of the dustbins removed regularly and

expeditiously are, under the present system, apparently insuperable, and we hope many of our vestries and district boards will take heart of grace from the good results attending the change at Islington, and will profit by so excellent an example.

We are glad to find that the mortuary which has been provided is being increasingly used. An additional advantage has now been gained, by the erection of a court-room for the coroner, so that inquests can be held decently without recourse to a public-house or equally undesirable place of meeting. In other respects, such as the condition of the slaughter-houses and cow-houses, and the noxious trades at Belle Isle, the district seems to be improving, and the Sale of Food and Drugs Act would appear to be very efficiently carried out, a total of 591 samples having been examined by Dr. Tidy since his appointment.

There is no other point of general interest arising out of the statistics for Islington itself; but, in speaking of the water supplied to the district by the New River Company, the results of the analyses of which are fully recorded in the report, Dr. Tidy takes occasion to make a vigorous defence of river water, against which he considers there is no real case. So far, we agree with him; indeed, we have already expressed ourselves (vol. x, p. 309) as strongly opposed to the fashionable unqualified denunciation of river water. But we think that Dr. Tidy has gone a little too far in placing river water on an equality with spring or deep well water. We are prepared to admit that the agitation which was got up last year for the general substitution of chalk water for river water was unnecessary and unwarranted by facts, but river water has many dangers from which spring water is exempt, and we think it must be admitted that, if the abstract question of health had alone to be considered, well water should be used in preference to that derived from rivers, which must inevitably be more or less polluted.

NOTES OF THE MONTH.

SEA AIR FOR SICK CHILDREN.

We learn, from the *Boston Surgical and Medical Reporter*, that the Children's Hospital of Philadelphia has had for several years a summer hospital at Atlantic City, where the little patients, with their mothers, are well cared for. Experience has shown that the sea air is the great specific for summer complaints, and this institution has done very great service. During former years it was the custom to give the city children free excursions to Fairmount Park during the hot weather, but for the last three years a sanitarium for children has been located on an island in the Delaware opposite the city front, which is largely patronised by the poor. Everything is free, including transportation, food, medicines, and attendance, and it is accomplishing a great deal of good. It would be well if some similar scheme could be organised for the benefit of the sickly infants of our large towns, who are carried off in such large numbers by infantile diarrhœa and cognate complaints.

SCARLET FEVER AT NEWHAVEN.

Various reports having been in circulation in reference to an alleged outbreak of scarlet fever at Newhaven, we are glad to be in a position to give authentic information as to the real state of matters in this town, important as being a centre of passenger traffic between this country and Paris. Our correspondent writes: 'At Newhaven and the adjoining village of Denton, during the last month, a few cases of scarlatina of a mild type have occurred. Two deaths only were reported up to the 30th ult., one from dropsy following scarlatina, the other from the same disease after a few hours' illness. Three weeks ago, a case, somewhat of a malignant type, the first of its kind, occurred in the family of the master of the Board School: it recovered. As in this house there were several children and only two small bed-rooms, Dr. Fussell, the Medical Officer of Health, requested immediate removal of the child; but the father and his children left, leaving the mother and an infant and the infected child. The Board Schools and a large private school were closed. The manifest inconsistency of closing day schools and keeping open Sunday schools, which are usually held in confined places, was not acknowledged at the onset. However, Dr. Fussell insisted on the latter being closed, and they are not open at the present time. The Inspector of Nuisances, in the course of a thorough search in the town, could only find one new case on the 30th ult. Newhaven is full of courts and alleys, and has some cesspools, and no regular system of drainage, with an imperfect well-water supply; the railway station, large hotel, and the houses near the station, have a good supply of pure water from Denton. It is fortunate that the able and energetic health officer, Dr. Fussell, has been successful in stopping the epidemic so far. There are only a few fever beds at the Workhouse for isolation; these are but seldom used, although Newhaven is a port sanitary authority, and is visited by sailors from all parts of the world. Under the circumstances, the difficulties in dealing with these diseases under such drawbacks is immense. As the epidemic has abated the schools can now be re-opened.'

ANIMAL VACCINATION.

Dr. Cameron has introduced a Bill into the House of Commons with a view of obviating the objection which some people have to vaccination, on the ground that, if the lymph has been obtained from an unhealthy child, some maladies may unintentionally be communicated along with the cow-pock. The Bill imposes on public vaccinators the duty of vaccinating a child with animal lymph whenever its parent or the person having charge of it requires them to do so. The Local Government Board is directed to take such measures as may from time to time be necessary to secure for the public use a supply of animal lymph, and to provide for its distribution to public vaccinators and medical practitioners, the cost of such measures being defrayed out of moneys provided by Parliament. A maximum penalty of three months' imprisonment, or of a fifty pound fine, is imposed on those who knowingly supply or use as an animal lymph for vaccination anything that is not so. 'Animal lymph' is defined as being vaccine lymph, either fresh or preserved, ob-

tained directly from cow-pock vesicles upon a calf or heifer, and derived by propagation through a series of calves or heifers from virus obtained from a case of natural cow-pock. The Bill has been withdrawn from lack of time, but the subject will require to be dealt with.

SCHOOLS AT WINCHESTER.

Last year we had occasion to comment somewhat severely on the state of affairs reported by the Medical Officer of Health as existing at a certain school at Winchester, thinking that such shocking neglect must needs be quite exceptional (see vol. ix, p. 167). We therefore read with surprise in Mr. Langdon's report for 1878 that, at another school for more than eighty boys, where there was a severe case of enteric fever, the following conditions injurious to health were found on inspection: 1. The urinal offensive, and no water laid on; 2. The pail closets (receiving the chamber slops, and only five in number) unsupplied with dry earth or ashes; 3. The sink not trapped, and the drain from it, the urinal, and for bath water, blocked up; 4. No water-supply, except that in a fish-pond in the centre of the yard in which the boys play, swim their boats, and sometimes fall; 5. As many as twelve boys bathed in the same water. It is not, however, to these private schools that sanitary defects are limited. In the same report, Mr. Langdon adverts to the fact that the enclosed space of the cloisters of Winchester College surrounding the chapel attended by the junior boys is still used for interments; and observes, with great show of reason, that he is at a loss to know why the College authorities should wish to continue these interments, as although they may bury with what they call the most 'approved precautions', how can they guard against the evils which may arise from turning up soil so full of human remains?

THE HEATING OF SCHOOLS.

The magistrates of Berlin a short time ago organised a scientific investigation of the arrangements for the heating and ventilation of the schools in that city. Of the 120 schools examined (in 118 buildings) forty-five had local heating with Dutch tile and iron stoves, fifty-four air heating, twenty-two low-pressure water heating, three mean-pressure water heating, one high-pressure water heating, and one air and water heating. The committee thought the following the chief points to be aimed at:—1. The temperature to be kept at a suitable height (19° C. at the most), without the teacher having constantly to look after it. 2. The temperature of each school-room to be capable of regulation independently of all the others. 3. The temperature to show little difference in different parts of the class, horizontally and vertically. 4. The ventilation to be such that the air admitted be free of dust, noxious gases, and infectious matters, that it give no cause for complaint as regards moisture or temperature, and that it be renewed sufficiently to prevent impurities from breathing of the scholars reaching a limit dangerous to health. The committee came to the conclusion that, as regards ventilation and regular distribution of heat in space, the method of central heating, and especially air heating, is vastly superior to local heating, and that most of the complaints against it are groundless.

THE WATER SUPPLY OF CHESTER.

Last quarter the Chester water, as taken from the Dee, was found by Dr. Kenyon to be bad on April 8, good on May 9, and very bad on June 9. Although the water taken for analysis from the river direct, in April and May, was taken at high tide, there was no appreciable increase, as compared with what is usual in dry weather, in the amount of chlorine. In some places fresh water is known to float on the surface of salt water, and it has been suggested that this may happen when the tide rises in the Dee. On the 9th of May, therefore, a sample of water was taken, with proper precautions, from near the bottom of the river, as well as near the surface; but there was no difference in the amount of chlorine found. Samples were taken in the same way at Queen's Ferry on the 8th of May. The amount of chlorine found here was about half that of sea water, and there was very little more in that taken from the bottom of the river than from the top, viz., 742 to 693 grains per gallon respectively. The water taken from the main in Whitefriars for analysis in April and May, was extremely good; that taken from the main in June, although of indifferent quality, was a great improvement on that taken direct from the river. The condition of the water was noted by Dr. Kenyon 41 times, and except after the heavy rains, from the 9th to the 14th of June, it was clear and well filtered. The danger, however, incidental to the use of any river water is shown in the accident which occurred after the storms of last month, when the drainings of several lime and lead works were washed into the Dee and poisoned some tons of fish. It is impossible to suppose that this mixture of poisonous mineral matters has not had an injurious effect upon the quality of the drinking water of Chester, and we shall await with interest Dr. Kenyon's next quarterly report for information on this subject.

THE BARNSLEY SEWAGE FARM.

In the month of August 1877, a sewage farm, at a place called Burton Grange, was opened by the Barnsley Corporation. Only 10 acres of land were then fully laid out, on the principle of intermittent downward filtration, and 14 more for broad irrigation; but in each case the purity of the effluent water was, and still continues to be, such as to demonstrate, beyond contradiction, the feasibility of the plan. Except on a few days in 1878, after heavy rains, when the river and the Lough Dyke were both in flood, the whole sewage which enters the Dyke was passed through the land. On about fourteen days, many thousands of gallons of additional water from the river were added to the sewage, to help in the consolidation of the soil. The long continued cold weather in December and January last was, Dr. Sadler thinks, a help rather than a hindrance—the frost pulverising and improving the soil, whilst any ice that might form in the furrows was easily melted by the next supply of sewage. (See, on this subject, vol. x, p. 143.) The effluent is unexceptionable in appearance, and having been analysed by Professor Attfield, has been pronounced by him to be well within the standard proposed by Dr. Frankland for effluent waters to be admitted into rivers. The produce of the farm is excellent; and although the abundance of food last summer interfered with the sale of rye-grass, yet, on the whole, it met with a ready market; and there seems to be a fair prospect that, in a few years' time, when it has got into regular working order, it will be possible to obtain a good rent for the farm.

SEWER VENTILATION.

The necessity of the ventilation of sewers seems to be generally conceded, though there is at least one important town in England whose sewers are not ventilated at all. Means for full and permanent ventilation of town sewers and house drains are required to prevent stagnation or concentration of sewage gases within sewers and drains, and with numerous openings from the sewers to the external air, there will be unceasing motion and interchange between the outer air and the inner sewer air, which will bring about and maintain extreme dilution and dispersion of any sewage gas as soon as generated. It has been found by experiment, that in unventilated sewers the gas concentrates, and so becomes deadly; whilst, in fully ventilated sewers, the sewer air is purer than that of some stables, or even than in a crowded public room when occupied. On this subject, the remarks made by Lieut. Hoxie, engineer of the district of Columbia, in a report recently issued by him are interesting. He says:—'The use of absorbents and disinfectants for disposing of the gases will do perhaps for a special and limited application, like the use of a trap for local suppression, but the attempt to capture in this way the gases generated in 130 miles of sewers, has not the appearance of practicability. The copious admixture of pure air with these gases renders them innoxious, and the difference of temperature between the sewers and the external air, together with the great "diffusive power" of the gases, which are of slight density, afford the means of introducing air into the sewers, and withdrawing the diluted gases. I am aware that opposing views have been recently advocated, and the theory of close sewers and entire absorption of the gases by running water has been advocated; but in the light of all past experience, I am inclined to trust to the combined action of this little stream of running water from the daily water supply, supplemented at long intervals by the cleansing and scouring effect of storms, and to the superincumbent 80 miles of atmosphere, from which we draw at pleasure, to dilute these gases, oxidize and render them innoxious. The building regulations of the district now contain the necessary provisions for the ventilation of dwellings, but the requirements may be perfected by a code of rules for the guidance of plumbers and builders.'

BUILDING BYE-LAWS.

Our attention has been drawn, by numerous correspondents, to the disabilities under which their districts would suffer, if obliged to accept the model bye-laws of the Local Government Board, as to new streets and buildings in their entirety, as the Whitehall authorities seem disposed to require. They point out that if they place such restrictions as the model bye-laws impose upon the builders of the vicinity, the latter will stop all building operations in the district, and erect dwellings in any adjoining district where there are no such restrictions. This difficulty certainly does exist, and we hardly see how it can be surmounted, whilst our present permissive legislation on the subject exists. Section 157 of the Public Health Act exacts that urban authorities may (not must) make by-laws as to new streets and buildings; and it is not to be wondered at if jerry-builders take every advantage of so very weak a clause. We confess we are much of Mr. Michael's opinion, that bye-laws on important matters are to be deprecated, and that the provisions usually inserted in bye-laws should form part of a general statute, and should only be special in those matters which local peculiarities render essential. Local Authorities should look less to the immediate gain to the district that the building of a few houses may bring, than to the advantages to the public health which a proper and sufficient code of bye-laws will ensure. In another column we give an example, stated by a practical man, of the way in which such difficulties as those apprehended may be surmounted, and we do not doubt that a little patience will produce a like result in other parts of the kingdom.

CORONERS' INQUESTS.

At an inquest recently held by the Liverpool coroner, on the body of a joiner, aged 69, the evidence was to the effect that the deceased had all his life been a healthy and temperate man, and that on the night before his death he went to bed as usual after his tea, at which he had taken a little lettuce. On the next morning he appeared to be suffering from a severe bilious attack, and looked very drowsy; at nine o'clock he appeared to be in a fit, and he died the same afternoon. A *post-mortem* examination pointed to the conclusion that death was primarily the result of apoplexy, which was induced by the quantity of opium contained in the lettuce, and which would be dangerous to an elderly person. The jury found that death had resulted from poison, but whether or not it was contained in the lettuce there was not sufficient evidence to show. This report shows in what a perfunctory manner inquests are conducted under the present system. Thirteen men, including the coroner, meet to determine the cause of death, and arrive at the conclusion that 'death had resulted from poison'. There is a total absence of evidence that any poison had been taken, and there is certainly no evidence to show that the lettuce which the deceased had eaten could have caused the apoplectic symptoms under which he died. There is no opium contained in lettuce, but a minute proportion of lactucine, which has a feebly narcotic action. This principle, extracted from half a dozen lettuces, would not suffice to account for the symptoms and death. This was most probably due to an ordinary attack of apoplexy. This is the type of thousands of inquests held in this country. They either leave the case as they found it, or throw a false light on the cause of death, and thus mislead the Registrar-General in his statistical tables of mortality.

PHTHISIS AND SUBSOIL DRAINAGE.

In reporting on the public health of the Watford rural sanitary district, Dr. C. E. Saunders adverts to the fact that Rickmansworth has again the highest death-rate of any place within the jurisdiction of the authority, and observes that it affords a good example of the variation in the healthiness which may be expected in a place with a high and fluctuating subsoil water. During last year no less than 18 deaths from phthisis occurred in the parish (as against 6 the year before), being nearly half the number of deaths from that disease throughout the entire district. In addition, there were 10 deaths from other diseases of the respiratory organs in the parish. The effect which lowering the subsoil water has on pulmonary disease being a recognised fact, both at home and abroad, Dr. Saunders has recommended a system of drainage for the place, but the Parochial Committee, ignoring this important factor

in the sanitary condition of their parish, prefer to consider, as sufficient for the purpose, a better system of scavenging! We would commend to the particular attention of this committee the able report by Dr. Buchanan on the Relation of Phthisis to Dampness of Soil, contained in the Tenth Report of the Medical Officer of the Privy Council, with Mr. Simon's equally able remarks thereon.

THE CHURCHYARD AT SHERE.

A horrible case in reference to the state of the churchyard of Shere has just been reported to the rural sanitary authority. In digging a grave a human body was exhumed in a semi-decomposed state, lying only four feet beneath the surface. It was allowed to lie some hours by the grave-side, and in the mean time a large hound got access to the churchyard, and was discovered devouring the flesh from the portions of the corpse that remained. The Medical Officer of Health for the district, Mr. George Fisher, reporting upon the case, observes:—'A grave was dug, and to get down four feet a human body was exhumed, which was only partially decayed, the brains and ligaments still remaining, in an advanced state of decomposition, and giving off a most horrid smell. A second corpse was partially to be seen, within three feet of the surface. It was left in this state for twenty-four hours, and was within 30 feet of the house in the churchyard. The smell in the rooms facing the graveyard was so strong that they were quite unbearable. One corpse was buried within nine feet of this house last year, and soon after there was a case of typhoid fever; and the same in 1877, after a corpse had been buried close to this house. The churchyard is above the well that supplies the house, and these bodies have been buried in a line with it. This part of the graveyard is quite full, and it is not advisable that more bodies should be buried here, as the whole of the yard drains into the stream close to it, and the water at the present time is used by several families in the village.' The medical officer adds: 'I ordered this grave to be filled in, and the corpse to be buried further from the house.' The sanitary authority has forwarded the report to the Home Secretary, and to the Local Government Board.

THE SANITARY AND MORAL INFLUENCE OF THE CRÈCHE.

Dr. Weir sends us the following:—'I regret that in my article on the above subject, in last month's SANITARY RECORD, I omitted to call particular attention to Mrs. Hilton's *Crèche*, at Stepney. It is well known that the lady mentioned was the first to introduce the *crèche* into London; and that, notwithstanding difficulties, apparently insurmountable, her efforts have been crowned with success. The institution is conducted, as far as possible, in accordance with the Belgian system, which originally served as a model to Mrs. Hilton. The importance of Mrs. Hilton's work has been fully recognised by those in this country who have made her *crèche* a model for fresh efforts in this direction; and as the subject of *crèches*, in relation to the prevention of infant mortality, becomes better known and appreciated by the British public, it will receive the national recognition which is due to its philanthropic and self-denying founder.'

LONDON TEMPERANCE HOSPITAL.

The Committee of the London Temperance Hospital have issued their report for the year 1878, which shows that during that period 140 in-patients, and 1,177 out-patients were treated, entirely on the non-alcoholic system. It is satisfactory to observe that the committee are encouraging some pecuniary acknowledgment on the part of patients, a sum amounting in the aggregate to £183 15s. 8d. being added to the year's income from this source. By this system not only are the funds of the hospital sensibly increased, but a feeling of self-respect in the patients themselves is fostered and upheld.

THE ILFRACOMBE HOTEL.

Those who have visited Ilfracombe will learn with pleasure that the board of management have taken into consideration the sanitary arrangements of that magnificent building known as the Royal Ilfracombe Hotel, and that the result of their operations has been the complete reconstruction of the drainage and water supply, by the removal of all the old and imperfect contrivances, and the substitution of the most approved appliances requisite for the present advanced stage of sanitary science. Two of the most important improvements which have been carried out are the disconnection of the hotel from the town sewers, and an automatic system of flushing the drains, which are scoured twice daily with 500 gallons of water, discharged from a cistern constructed for that purpose on the roof of the house. With respect to the water supply, this has also been greatly reformed, and a slate cistern of the largest size has been erected for supplying drinking water only. Several other minor improvements have also been made. New baths, sinks, and lavatories have been added, the wastes of which deliver in the open air, and the condition of the closets and soil pipes has been completely altered. Altogether, it may be said that there are few buildings which can rank with this hotel, either in the salubrity of its site or the excellence of its arrangements. This work was most ably carried out by Mr. Robbins, architect, of Ilfracombe, from the plans, etc., supplied by Mr. Eassie.

THE PUBLIC HEALTH DURING JULY 1879.

IN twenty of the largest English towns, dealt with by the Registrar-General in his weekly return, 25,332 births, and 12,520 deaths were registered during the five weeks ending 2nd inst. The births were 562, and the deaths no less than 5,001, below the numbers returned in the corresponding five weeks of 1878. The deaths included 1856 which were referred to the seven principal zymotic diseases, against 5,246 in the corresponding period of last year; 486 resulted from measles, 463 from scarlet fever, and 378 from whooping-cough. The 1856 deaths from these seven zymotic diseases were equal to an annual rate of 2.6 per 1,000 persons living in the twenty towns; this zymotic rate did not exceed 0.8 in Brighton, and 1.0 in Portsmouth, while it ranged upwards in the other towns to 3.0 in London, 3.1 in Newcastle-upon-Tyne, and 3.2 both in Salford and Sheffield. Scarlet fever showed the largest proportional fatality in Newcastle-upon-Tyne, Oldham, Sheffield, and Sunderland; measles in Bradford, Salford, and London; and whooping-cough in Bristol. Fever, principally enteric, caused 145 deaths in the five weeks, of which only 56 occurred in London, and 89 in the provincial towns.

Diphtheria, on the other hand, was most fatal in London, where 45, of the 65 deaths in the twenty towns, were registered during the five weeks. Small-pox caused 34 more deaths in London and its outer ring of suburban districts, whereas only one occurred in the nineteen large provincial towns. The number of small-pox patients in the metropolitan asylum hospitals, which was 195 on the 28th June, steadily declined during July, and was but 108 on the Saturday, 2nd August. The weekly number of admissions to these hospitals, which averaged 47 in June, declined to 21 in July.

The most remarkable feature in the recorded zymotic fatality of the twenty towns during July, was the comparative immunity from the usual mortality from infantile summer diarrhœa. The deaths referred to diarrhœa in the twenty towns during the five weeks ending 2nd instant, were but 290, against 3,454 in the corresponding weeks of 1878. We have shown that the deaths from the seven diseases in the twenty towns last July were 3,390 less than in July 1878; and it appears that 3,164 of this decrease of zymotic fatality was due to the remarkable freedom from summer diarrhœa, mainly infantile. The Registrar-General has pointed out that no approach to so low a death-rate from diarrhœa in July has been recorded since 1860, when the summer temperature was unusually low. Mortality statistics for these twenty towns are not available for July 1860. It appears, however, that in London 140 deaths were referred to diarrhœa, during the five weeks ending 2nd instant, against 182 in the corresponding period of 1860; this signifies that the annual death-rate from diarrhœa in London, in July 1879, did not exceed 0.40 per 1,000; while, in July 1860, it was equal to 0.69. Thus, even during the cold July of 1860, the fatality of diarrhœa in London exceeded, by more than 50 per cent., that which prevailed during last July. The rate of mortality from diarrhœa last July in London, and in the 19 large provincial towns, was almost identical; the remarkable immunity from epidemic summer diarrhœa appears to have been general in all the large English towns. In some of the Continental and American cities, notably in Berlin, Brooklyn, and Baltimore, the mortality from diarrhœa diseases was, however, exceptionally high.

The annual rate of mortality from all causes per 1,000 of the nearly seven and a-half millions of persons estimated to be living in the twenty towns, which had been equal to 25.7, 22.0, and 19.1 successively, in April, May, and June, further declined to 17.7 in the five weeks of July. In the corresponding periods of the three years, 1876-7-8, the death-rate in these towns averaged 24.3, 20.7, and 25.2 per 1,000 respectively. It appears more than probable that the death-rate in England and Wales during last July was unprecedentedly low. Indeed, if the usual relative proportion between the death-rate of the twenty towns and that of the whole country was maintained, it may be estimated that the general death-rate in England and Wales during July did not exceed 15.3 per 1,000.

The lowest annual rate of mortality during July in these twenty towns was 12.1 per 1,000 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Nottingham, 15.1; Brighton, 15.9; Bristol, 16.2; Leicester, 16.8; Hull, 16.9; Birmingham, 17.0; Leeds, 17.2; Sheffield, 17.3; London, 17.7; Wolverhampton, 17.7; Plymouth, 17.7; Sunderland, 17.9; Bradford, 18.2; Oldham, 18.2; Salford, 18.6; Liverpool, 18.8; Manchester, 20.4; and the highest rate during the month, 22.3, in the borough of Newcastle-upon-Tyne. It is worthy of note that the death-rate in London was identical with that which prevailed in the aggregate of the nineteen large provincial towns. The high death-rates in Manchester and Newcastle-upon-Tyne were not to any considerable extent due to the fatality of zymotic diseases.

Unfortunately, the Registrar-General's Weekly Returns give no information as to the mortality from diseases of the respiratory organs for any of the towns except London. It appears that during the five weeks of July 921 deaths were referred to those diseases in London, which exceeded the corrected average weekly number in the corresponding periods of the last ten years by 145, or nearly 19 per cent. It may be assumed, therefore, that these diseases showed a general excess in the large towns, and were probably the principal cause of the high death-rates in Manchester and in Newcastle-upon-Tyne. The uniform monthly mortality statistics of urban sanitary districts, which we hope to be enabled to publish regularly through the co-operation of Medical Officers of Health, will throw much light upon the local and seasonal variations in the rates of mortality from these diseases.

In inner or registration London, the death-rate from all causes in July was equal to 17.7, and from the seven zymotic diseases to 3.0 per 1,000 of the population. The zymotic death-rate was rather higher in London than in the aggregate of the nineteen large provincial towns. In the outer ring of suburban districts around London (having a population estimated at little short of a million persons), the annual death-rate from all causes did not exceed 12.3 in the five weeks under notice, and the zymotic rate was but 1.5 per 1,000.

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Five Weeks ending Aug. 2nd, 1879.				
		Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000.	
					All Causes.	7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns . .	7,383,999	25,332	12,520	1856	17·7	2·6
19 Provincial Towns .	3,763,131	13,043	6,386	829	17·7	2·3
London (Reg. Gen.) .	3,620,868	12,289	6,134	1027	17·7	3·0
Brighton (borough) . .	105,608	278	161	8	15·9	0·8
Portsmouth (borough) .	131,821	401	153	12	12·1	1·0
Norwich (borough) . .	85,222	260	134	12	16·9	1·5
Plymouth (borough). .	74,303	225	126	13	17·7	1·8
Bristol (city) . . .	209,947	670	325	50	16·2	2·5
Wolverhampton (borough)	75,100	262	127	13	17·7	1·8
Birmingham (borough) .	388,884	1,441	632	104	17·0	2·8
Leicester (borough) . .	125,622	444	202	21	16·8	1·7
Nottingham (borough) .	169,396	572	245	24	15·1	1·5
Liverpool (borough) .	538,338	1,957	972	116	18·8	2·2
Manchester (city) . .	361,819	1,300	707	98	20·4	2·8
Salford (borough) . .	177,849	682	317	54	18·6	3·2
Oldham (borough) . .	111,318	358	194	25	18·2	2·3
Bradford (borough) . .	191,046	575	334	47	18·2	2·6
Leeds (borough) . .	311,860	1,108	513	57	17·2	1·9
Sheffield (borough) . .	297,138	1,024	492	92	17·3	3·2
Hull (borough) . .	146,347	554	237	21	16·9	1·5
Sunderland (borough) .	114,575	420	197	18	17·9	1·6
Newcastle-upon-Tyne (borough) . . .	146,948	512	314	44	22·3	3·1

HEALTH OF OTHER SANITARY DISTRICTS IN JULY.

With a view to afford facilities for the publication of uniform monthly mortality statistics of the larger urban sanitary districts, circulars with forms for the

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JULY 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Deaths under one year of age to 1,000 births	Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	7 principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs		
Aston Manor	51,408	197	62	20	10	2	2	14	14	11	—	5	1	1	4	—	—	15	7	1	—	45.1	14.2	2.5	3.4	102	H. May.
Barnsley	30,000	126	50	20	6	2	3	11	8	6	—	1	2	—	—	2	1	12	5	1	3	49.5	19.6	2.4	4.7	159	M. T. Sadler, M.D.
Batley	28,721	88	34	6	4	3	2	13	6	3	—	—	—	—	—	1	2	7	3	1	—	36.1	13.9	1.2	2.9	68	W. Bayldon.
Bilston	*	33	9	4	—	4	11	5	1	—	—	—	—	1	—	—	—	*	*	*	*	*	16.1	0.5	*	*	W. M. Hancox.
Bolton	105,000	298	140	42	19	4	11	37	27	13	—	3	—	—	3	2	5	29	11	6	—	33.4	15.7	1.5	3.3	141	E. Sergeant.
Bootle-cum-Linacre	25,500	95	20	5	7	1	—	5	2	5	—	1	1	2	—	—	1	3	2	—	—	43.9	9.2	2.3	1.4	53	R. J. Sprakeling.
Cambridge	34,000	87	43	8	6	2	3	10	14	1	—	—	1	—	—	—	—	5	6	1	5	30.1	14.9	0.3	1.7	92	B. Anningson, M.D.
Canterbury	20,962	72	26	5	2	2	2	7	8	2	—	—	—	—	—	1	1	5	5	1	4	40.4	14.6	1.1	2.8	69	F. Wacher.
Cardiff	80,150	260	112	28	21	7	7	21	18	18	—	1	4	2	5	2	4	13	13	5	11	38.2	16.5	2.6	1.9	108	H. J. Paine, M.D.
Cheltenham	45,000	102	47	4	4	3	4	16	16	1	—	1	—	—	—	—	—	6	10	2	4	26.7	12.3	0.3	1.6	39	T. Wright, M.D.
Colchester	28,633	53	37	4	2	3	5	14	9	2	—	—	—	—	1	1	—	2	6	2	6	21.8	15.2	0.8	0.8	75	E. Waylen.
Coseley	23,000	72	25	11	3	*	*	*	*	1	—	—	—	—	—	—	1	3	3	—	—	36.9	12.8	0.5	1.5	153	J. Eagleton.
Coventry	41,000	114	48	14	2	2	4	13	13	4	—	—	—	—	1	1	2	5	3	2	9	32.7	13.8	1.1	1.4	123	M. A. Fenton, M.D.
Croydon	69,500	203	78	13	6	8	6	29	16	6	—	—	2	2	1	1	—	5	13	4	10	34.4	13.2	1.0	0.8	64	C. W. Philpot, M.D.
Derby	80,385	290	120	22	30	*	*	*	*	21	—	2	16	1	—	1	1	15	17	2	13	42.5	17.6	3.1	2.2	76	W. Iliffe.
Devonport	50,000	*	70	19	5	3	2	19	22	3	—	3	—	—	—	—	—	9	10	3	11	*	16.5	0.7	2.1	*	J. May, junr.
Dewsbury	31,000	106	49	*	*	*	*	*	*	4	—	—	—	—	—	2	2	—	—	—	11	40.3	18.6	1.5	0.0	*	W. F. Watts.
Dover	33,028	92	44	6	4	4	3	10	17	3	—	—	—	—	—	2	1	8	3	2	5	32.8	15.7	1.1	2.9	65	M. K. Robinson, M.D.
Glossop	17,072	53	18	5	3	1	3	2	4	1	—	—	—	—	—	—	1	1	4	1	1	36.6	12.4	0.7	0.7	94	J. Rhodes.
Halifax	71,500	162	118	28	22	*	*	*	19	19	—	2	10	—	4	2	1	25	13	—	16	26.7	19.4	3.1	4.1	173	D. Ainley.
Hanley	48,091	170	72	28	11	2	3	23	5	6	—	1	—	—	—	1	4	11	8	1	—	41.6	17.6	1.5	2.7	165	J. S. Walker, M.D.
Jarrow	22,000	101	37	8	6	4	2	12	5	6	—	—	—	—	4	2	—	7	6	1	—	47.9	17.5	2.8	3.3	79	J. Spear.
Kidderminster	22,000	60	38	6	9	5	—	4	14	12	—	5	5	1	—	1	—	4	1	—	8	32.1	20.0	6.4	2.1	100	D. Corbet.
Leigh	20,400	76	35	10	4	3	—	11	7	6	—	—	3	—	—	2	1	2	6	2	—	43.9	20.2	3.5	1.2	132	J. Hall.
Longton	23,000	67	34	12	2	2	1	11	6	1	—	—	1	—	—	—	—	5	6	4	—	34.3	17.4	0.5	2.6	179	J. Weaver, M.D.
Merthyr Tydfil	50,350	137	73	13	10	3	9	25	9	1	—	1	—	—	—	—	—	7	12	8	2	30.1	16.0	0.2	1.5	95	T. J. Dyke.
Newcastle-under-Lyme	18,000	64	28	13	1	*	*	*	7	2	—	—	—	—	—	—	2	4	4	—	—	41.9	18.3	1.3	2.6	203	St. J. Edwards, M.D.
Oldham	111,318	357	192	40	32	19	16	54	31	25	—	2	11	—	6	1	5	29	24	8	16	37.8	20.3	4.2	3.1	112	J. M. Sutton, M.D.
Penzance	11,000	24	12	3	1	—	1	2	5	1	—	—	1	—	—	—	—	2	2	—	—	25.7	12.8	1.1	2.1	125	G. B. Millett.
Preston	87,600	266	143	38	31	*	*	*	27	23	—	1	10	—	—	3	9	30	13	7	2	35.8	19.2	3.1	4.0	143	H. O. Pilkington.
Rochdale	71,199	161	105	19	16	12	9	29	20	11	—	1	5	—	2	1	2	11	9	1	—	26.6	17.4	1.8	1.8	118	J. M. Wilson, M.B.
Rochester	18,352	58	29	7	1	2	3	8	8	1	—	—	—	—	1	—	—	2	6	3	7	37.2	18.6	0.6	1.3	120	J. S. Knight, M.D.
South Shields	61,000	181	90	24	24	7	7	13	15	17	—	2	3	—	4	2	6	13	9	5	7	38.7	19.2	3.6	2.8	133	J. Spear.
Torquay	25,000	*	20	2	4	1	3	6	4	—	—	—	—	—	—	—	—	3	5	2	—	*	9.4	0.0	1.4	*	P. Q. Karkeek.
West Derby	32,263	90	36	4	5	3	1	10	13	6	—	—	4	—	1	1	—	4	2	—	—	32.8	13.2	2.2	1.5	44	W. Carter, M.B.
York	46,436	149	68	16	9	2	3	16	22	2	—	1	1	—	—	—	—	10	9	2	5	37.8	17.2	0.5	2.5	107	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

required information were at the end of July addressed to the medical officers of health of sixty-seven districts, requesting that the forms might be returned not later than August 7th. In an accompanying table will be found the results of this circular, which, if not quite as satisfactory as we would have desired, afford ground for hope that the true value of such a means for the interchange of uniform mortality statistics will be sufficiently recognised to enable us by degrees to extend this experiment to other sanitary districts.

Some medical officers of health, while recognising the utility of the publication of such uniform statistics, object to their being published each month, on the ground that the numbers would be so small as to be worse than useless, on account of liability to misinterpretation. We do not think that this is altogether a valid objection, although it is one that has not unfrequently been made to the Registrar-General's Weekly Return. It should be remembered that monthly returns for a town of 25,000 inhabitants would not be liable to greater fluctuations than are weekly returns for a town with a population of 100,000; and we have yet to be convinced that any mischief has resulted from the publication of the Registrar-General's weekly mortality statistics. Extensive data are undoubtedly necessary for the foundation of sound conclusions as to comparative sanitary condition; but we think there ought to be little danger of mischievous misinterpretation of such statistics as we have been enabled to publish through the co-operation of medical officers of health, by readers of a scientific journal like the SANITARY RECORD. These statistics of mortality supply, as it were, a monthly bill of health for all the contributing sanitary districts, and are useful as such, apart from the comparative value of the calculated rates of mortality which for single months are of limited utility; they enable the student, however, to estimate the bearing of the crude figures. We shall hope from time to time to add to this list of contributing urban sanitary districts. Such prompt information of the fatality of the principal zymotic diseases cannot fail to be useful to medical officers of health of neighbouring districts.

SPECIAL REPORTS.

DIARRHŒA FROM EATING DRIPPING.

BY JOHN W. TRIPE, M.D.,

Medical Officer of Health, and Public Analyst for the Hackney District.

A VERY severe outbreak of diarrhœa having occurred in a large family residing in this district, and occasioned the death of an infant, the medical attendant consulted me as to its probable cause, and in making enquiry as to the articles of diet used just prior to its occurrence, I arrived at the conclusion that it had been produced by some dripping bought at the door on Saturday, the 26th July. On extending my investigation, it was found that several persons had bought some of the same dripping on that day, and I therefore called at all the houses where they lived, and at those adjoining, and was informed that all those who had eaten of the dripping, with two exceptions, had suffered most severely, whilst there was not a case of diarrhœa in any of the other houses. Also that a visitor, who had had tea with one of the other patients on Sunday, was attacked the same night, being the only resident in that house who had so suffered. The disease occurred in four different streets, and there was no other cause common to all except that they had eaten some of the dripping. They all agreed that the dripping was sweet, and appeared quite good when purchased and eaten, except two members of one family, who ate some of the jelly taken from the under surface of the dripping, which they said had a slightly unpleasant taste. I called on the vendor, who told me that she bought the dripping on Friday, the 25th, from the cook to a large wholesale firm in the City, employing a large number of persons, all of whom dine there. I was also informed that none of the employés had suffered from diarrhœa.

The symptoms were nearly the same as those suffered some years since by a number of persons in this district (I think more than sixty), who had diarrhœa after eating sausages, viz., vomiting, purging, and much pain in the stomach, with great prostration, the tongue at first being much furred, and subsequently of a bright red colour, and glazed from loss of epithelium. The symptoms occurred in some of the patients within three or four hours after eating the dripping, and in others after the expiration of eight to twenty-two hours, those taking the largest proportions of jelly having suffered most severely. There were two infants at the breast, one of whom died with diarrhœa and convulsions on Tuesday, the illness having commenced on the Monday, and the other had a very narrow escape, being much prostrated when I saw it two days after the attack came on. This child, four months old, did not have any jelly or dripping, but its mother was exceedingly ill and prostrate on the Tuesday, and the other infant was not known to have had any given to it. There were twenty-nine persons attacked, who lived in nine houses, and in two of the houses there were two families; the one who did not have the dripping escaping, and the members of the other being attacked.

The dripping was eaten by most of the sufferers on bread, but, in two instances, it was used for making a meat pie, and produced, as in the other cases, diarrhœa and vomiting, but apparently not so great prostration as when eaten without being cooked a second time. The patients were of all ages, from about forty-five years down to the infants, the majority being children, and age did not seem to have any effect in modifying the symptoms, as the mother of one of the infants was more prostrate than any of the other persons I saw. In the sausage poisoning case already referred to, there was marked delirium, but that symptom was absent on this occasion. The history of one family will suffice to show the connection between the diarrhœa and vomiting, and the ingestion of the dripping. The father and a grown-up son did not partake of it, and were not affected; a grown-up daughter ate a little on Sunday and was not attacked, and a girl of ten also ate some, but carefully avoided the jelly, which she dislikes, and remained well; but all the others, seven in number, suffered more or less severely. The dripping was chiefly eaten at tea on Saturday, and the symptoms supervened in one child before twelve on the same night, and in all the others, except one, before daybreak of the Sunday; the other being attacked on Sunday afternoon, about twenty-two hours after eating it. In the other families, every one who ate of it was seized with diarrhœa, etc., in less than twenty hours.

I obtained a portion of the dripping and examined

it on Wednesday morning. It then had a peculiarly unpleasant smell, such as I have noticed in dripping which had been kept for some time. I put a portion into water, and gently heated it, stirring frequently and then allowing it to cool, for the fat to harden. On taking off the fat, I found it quite sweet, the liquor having the unpleasant smell previously noticed, but in a less degree. I allowed the liquor to stand, and drew off all but the lowest portion, which I submitted to a microscopic examination, and detected granular and nucleated cells of various sizes, resembling monads, and also a few bacteria, which were very active. I treated some of the dripping with benzole, to dissolve the fat, and on placing some of the lower part of the fluid under the microscope, found plenty of the granular and nucleated cells, but no bacteria. There were not any fungoid growths visible. I made a careful chemical analysis of the dripping and of the dried residuum obtained from the fluid, but without detecting any poison. The dried residuum was not offensive, the heat (212° Fahr.) employed having driven off the unpleasant smell. I think these facts show that the poisonous matter was contained in the jelly and not in the fat, as is commonly supposed. The short time that elapsed between the cooking of the meat and the sale of the dripping is one of the most noteworthy features in connection with this case, and shows that care should be used in hot weather to separate the whole of the jelly from the fat of dripping before using it. Indeed, it would be better if clarified. I think it very probable that the dripping was stored in a vessel previously used for the same purpose without being properly washed, and had in this way become tainted, as the vendor had bought twice a week for some time past, the whole of the dripping made at the establishment. In conclusion, I would remark that it is not improbable that dripping, changed in the same manner as this sample, has been an unsuspected cause of severe diarrhœa in many cases, and occasionally of death.

THE SANITARY STATE OF LYMINGTON.

ONE of the strongest arguments of the advocates of the germ theory is that insanitary conditions are often found to exist for many years without causing serious mischief until the specific poison of zymotic disease becomes associated with them. A case which gives much strength to this argument may be found at Lymington, where, according to a recent report of Dr. Hubert Airy to the Local Government Board, any number of unwholesome conditions exist, whilst the average death-rate is 17.5, and that for the last two years is considerably lower. Lymington hardly needs to be described. The advantages of its position as a yachting station are well known, and are made use of to a very considerable extent. Thirty or forty yachts, we are told, may be seen laid up there in the winter, and in the summer the place is much resorted to by yachting parties, for whose accommodation a large number of lodging-houses have been built.

The population is now estimated at 4,632, an increase of about 400 on the enumerated population of 1871. The town consists principally of one broad main street (High Street), which occupies the crest of a hill about 80 feet high, ranging nearly east and west, and descends steeply to a network of narrower streets near the water's edge. The hill is capped with a stratum of loose angular gravel to a depth of 10 or 12 feet; below this is a bed of blue clay 19 feet deep, and below the clay a bed of fine pure sand of much greater depth than those above it. The geological feature of most importance to be noted in relation to health is the porosity of the surface gravel in the higher parts of the town, and the impervious character of the clay bed which underlies it. Under these conditions it would almost necessarily happen that liquid impurities sinking into the porous gravel should be carried laterally into any well that might be sunk in the vicinity. This point will be seen to possess double importance in view of the existing mode of filth disposal and water supply in Lymington.

The town depends entirely upon wells, to the number of several hundreds, situated usually in rear of the buildings, and often in close vicinity to privies, pigsties, and other sources of pollution. The wells are sunk to different depths in different parts of the town; at the lower level, near the riverside, they are shallow, and the water rises to within a few feet of the surface; in the middle and upper parts of the town they are of variable depths, according as they do or do not pass through the bed of clay, as intervening between the gravel above and the sand below. Speaking generally, it is evident that the nature of the supply is of a dangerous kind, for the great bulk of the filth and refuse of the town is committed to the soil without sufficient precaution against soakage of fluid matter, and the porosity of the soil allows ready passage of fluid towards any natural or artificial depression in the water stratum.

From a survey of the district, made in 1877 by order of the local board, it appears that at that date there were 689 wells, of which 373 were reputed 'good', 41 'fair', and 275 'bad'. Of thirteen of these wells, it was noted that they were only three yards from a cesspool. Some were immediately adjoining. There were 132 houses without any private supply, but obtaining water from four or five public pumps and (at Woodside) from a brook. There has long been uneasiness in the town regarding the quality of the water. This feeling has found expression in several attempts on the part of the local board towards improvement; but these attempts, owing to want of unanimity, have hitherto produced no practical result. In 1875 a well was sunk to a depth of 40 feet through the gravel and clay, and into the fine sand in the upper part of the town, but the well has not been used. It was found to yield 2,000 gallons an hour, and this amount, though it would, if made available, have been of great benefit to the town, would yet have been barely sufficient for all domestic purposes. With a view to deepening the well, in 1877, a further boring was carried to 117 feet, with little increase in the supply obtained. At this depth the augur broke, and the attempt was abandoned.

One reason alleged for postponing the question of increased water supply is the incapacity of the existing sewers to carry the larger volume of sewage which such a supply would entail. The existing sewers are of small dimensions, mostly of brick, old and shallow laid, and there is reason to believe that in many places they have given way and allowed their contents to escape into the surrounding soil. The sewers carry surface water and house drainage, the discharges of one or two waterclosets, and the overflow from several cesspools. In every direction they have a good fall, but it is more than doubtful if they would suffice for their purpose if waterclosets were to be generally introduced. The main sewers from the eastern part of the town, including the steep slope of High Street, discharge into the river, one of them immediately beneath the jetty at which passengers land

from the steamboats, and another at the quay of a neighbouring brewery. Other smaller drains enter the river at several points lower down. There is much complaint of offensive smell from the sewer outfalls at the jetty and the brewery quay, which are both exposed at low water (except at neap tides). The solid sewage apparently is not carried away by the tide, but is precipitated by the salt water, and accumulates in the form of filthy pale-coloured mud round about the sewer outlets. This is stirred up by the frequent steamers, and gives off gases of decomposition. The outlet pipes of these sewers lie on the mud, and are liable to be silted up. The brewery quay outlet has a relief valve in the quay wall, by which the sewage escapes scarcely below high-water level when the lower mouth is obstructed, and thus there is a foul deposit of sewage mud up to the very foot of the quay wall. The river current at this point is but feeble; the flow of the tide is checked by a causeway and sluice a little higher up, and there is, therefore, but little back-water to carry out the sewage on the ebb tide. The sewers are occasionally flushed with the aid of water-carts. They are not, however, ventilated.

The most serious danger to the health of the district is to be found in the existing mode of excrement disposal, especially when taken in connection with the present water supply. With the exception of forty waterclosets connected with private cesspools, or, in a few instances, with the sewers, and a few earth closets, the ordinary garden privy is in general use throughout the district. At the survey of the district ordered by the local board in 1877, it was found that 587 houses had their separate privies, seventy-seven privies served two houses each, twenty served three houses each, three served four houses each, and there were two houses without any accommodation of the kind. The privies have open cesspits, which in the better and more modern examples are lined with cement, but in the vast majority are not cemented, and therefore not secure against soakage of their contents through the walls. Their situation in relation to dwellings and wells is often such as to be both offensive and dangerous. It is not necessary to dwell upon the nuisances to which this system gives rise, when, as in Lymington, it has been in use from time immemorial. It is only under almost unattainable conditions of original perfection of structure and subsequent maintenance and repair, combined with the most vigilant official inspection, that such a system could be kept free from nuisance and danger.

The state in which many of the privies were found at the time of the inspection showed that nuisance inspection, or, at least, nuisance repression, was by no means strictly carried out. There is no public system of cesspit scavenging.

In addition to these unwholesome conditions, the slaughter-houses are reported to have ill-paved floors, rude catch-pits for washings, neglected drains, filthy pigsties and dung-heaps, which combine to make them very offensive. There is, moreover, no hospital accommodation in the district.

It will be seen from the preceding, that the public health administration has been very defective. The Medical Officer of Health (whose appointment has now been put on a more satisfactory footing), has brought the sanitary defects of the district under the notice of the authority; but nothing seems to have been done to remedy them. The conditions described are such as to justify apprehension of an outbreak of enteric fever or other infectious disease in the event of a case being imported into the town, a risk which, situated as Lymington is, should by no means be lightly regarded.

'SANITAS.'

A LARGE party of gentlemen, including many eminent medical and scientific men and several members of the International Telegraphic Conference, recently visited the works of the Sanitas Company, in Letchford's Buildings, Three Colt Lane, Bethnal Green. The visitors included Lord Alfred Spencer Churchill, Count Wimpffen, Major Wood, Major Seymour, Mr. J. Abbis, J.P., Sir P. Colquhoun, Sir W. Drake, Sir W. Milne, Sir C. Bright, Admiral Selwyn, Sir Antonio Brady, Col. Martindale, C.B.; Drs. Ramsay, Farr, Bojanowski, Sedgwick Saunders, Iliff, Jesset, Haviland, Hinckes Bird, Cornelius Fox, Thurland, Roger, Corner, Bencraft, Sutton, Wilkinson, Vinen, Dudfield, White, Wright, Sprengel, Voelcker, Blyth, Burton, Tripe, Röth, Lovett, Gibbon, Notter Edmunds, Paul; Professors Redwood and Hartley; Messrs. Neison, Tribe, Thorp, etc., etc., and were received by Mr. C. T. Kingzett, F.C.S., F.I.C., who explained by the use of some simple apparatus the processes employed in the manufacture of sanitas. Mr. Kingzett first drew attention to several rows of very large receivers set in wooden vats. These bottles, which are made of a kind of earthenware, and will hold about 100 gallons each, are provided with three necks apiece. Through one of these apertures the charge of water, about 80 gallons, is introduced, and at a temperature of 160 degrees Fahrenheit. Turpentine is next poured in until a stratum 6 in. thick is floating on the surface of the water. Through the second hole a branch pipe descends from an air-main, carried above the rows of carboys to the line of contact between the turpentine and the water. From an air-fan made to rotate rapidly by a steam engine a continuous blast of hot air is forced along the mains, and this hot air, descending by the branch pipes above-mentioned, oxidizes the turpentine, at the same time throwing down some of the oxidized compounds into the water. As the carboys stand in vats kept full of hot water, an equable temperature is maintained, and the blast of hot air being driven through the liquids inside for 150 or 300 hours, according to the strength of sanitas required, the principles which, in combination with oxygen, give this product its valuable disinfectant and antiseptic qualities are all extracted from the turpentine. The third aperture allows the stream of air to escape after passing through the turpentine and water, and, as the heated air carries away a portion of volatilized turpentine, arrangements are made for catching this in a set of condensers. By slaking quick-lime with certain sanitas products, a disinfectant and deodorising powder is obtained, and by the saponification of a similar substance the soaps are made. Mr. Haviland, Medical Officer of Health to the Northamptonshire combination of Sanitary Authorities, in mentioning some important advantages which sanitas possessed over other disinfectants, said that, as it was not poisonous, it might be left with safety in the cottages of the poor, and that by its means furniture, linen, and clothing might be disinfected without injury. Mr. Kingzett stated that in the course of a series of experiments directed to prove that growing plants such as the eucalyptus and the pine do not give off ozone, but peroxide of hydrogen, a means of producing this powerful antiseptic suggested itself to him, which first made the

preparation of an article of commerce exhibiting its peculiar properties a possibility. After performing some experiments with various re-agents, Mr. Kingzett handed round various specimens of animal food which had been preserved simply by immersion in sanitas for nearly 200 days, and others in which the unpleasant and noxious effects of putrefaction had been counteracted at the time by the use of sanitas.

COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN JULY 1879.

The following are the Returns of the Society of Medical Officers of Health:—

Names of Water Companies.	Total solid matter per gallon.	Oxygen required by organic matter, etc.	Nitrogen.	Ammonia.		Hardness (Clark's Scale).	
			As nitrates, etc.	Saline.	Organic.	Before boiling.	After boiling.
	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Thames Water Companies:							
Grand Junction . .	21·74	0·139	0·105	0	0·011	14·2	3·0
West Middlesex . .	21·00	0·135	0·095	0	0·011	13·3	3·0
Southwark&Vauxhall	19·80	0·133	0·120	0	0·008	14·2	3·8
Chelsea	19·00	0·105	0·120	0	0·010	14·0	3·0
Lambeth	20·80	0·105	0·094	0	0·006	13·2	4·8
Other Companies:							
Kent	27·90	0·001	0·300	0	0·001	18·2	5·1
New River	19·80	0·056	0·135	0	0·003	14·0	4·0
East London . . .	21·80	0·066	0·105	0	0·007	14·0	3·6

NOTE.—The amount of oxygen required to oxidise the organic matter, nitrites, etc., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases. C. MEYMOTT TIDY, M.B.

ISAAC SHONE'S PNEUMATIC SYSTEM OF SEWERAGE.

ON Saturday, July 19th, a large number of engineers, medical men, and other professional gentlemen, met in the Town Hall, Wrexham, to consider the Pneumatic System of Sewerage invented by Mr. Isaac Shone (Mayor of Wrexham). The meeting had been convened by Dr. Lory Marsh, founder of the Sanitary Institute of Great Britain, and included a large number of gentlemen of the neighbourhood, and many well-known sanitary engineers.

Mr. Shone then proceeded to give an explanation of his system, of which a description will be found in the SANITARY RECORD, vol. x, p. 153.

Mr. Donaldson, M.A., C.E., said he would propose the three following resolutions, because he felt that when they put the matter in several phases they would be enabled better to do justice to the subject. His first resolution was, 'That the working parts of Mr. Shone's Pneumatic Ejector, and Mr. Sturgeon's Air Compressing Machinery, are so simple that the wear and tear and liability to get out of order are reduced to a minimum.' 2nd. 'That the system is admirably adapted in an economical and sanitary point of view, for the sewerage of low lying districts.' 3rd. 'That the system is admirably adapted for the sewerage of the low level districts of towns situated on gradually sloping ground, from which the sewage can be conveyed partly by gravitation.' In regard to the first resolution, he thought that the explanation they had received, and what they had seen, would convince them that the parts were as simple as they possibly could be. He regretted that Mr. Shone had not given them a large skeleton diagram of the ejector, showing the working of the automatic action of the valve. In regard to the 2nd resolution, one of the troubles of the ordinary gravitation schemes was that they must get their sewage to one point for the sake of economy of working, but with this system that necessity was avoided, as they could carry the air main where they liked, and also, therefore, have the pumping station where they liked. They could always get good gradients, there would be no deposit in their sewers, and they could get them at a slight cost. In regard to air compressing, it was admirable, when applied to this system, for raising sewage to any height, and it was very much cheaper than having great outfall sewers at low levels. In regard to the 3rd resolution, he thought the system was admirable for purposes of farming, because, in some instances, they may have a ridge or some other obstacle which they could not get over without tunnelling, etc.; but with this system they would have just to send the air-main over the hill and bring back the sewage. But the great object of all, he thought, was that in a flat district which was too low to have the sewage sent to a farm they had no need to send the sewage to the bottom. They could divide the space into zones, and put ejectors at various points. There may be a question raised on the point of 'reserve power'. In all systems they must have reserve power in one shape or another. There were two alternatives—have a great reservoir, or a great safety valve, that was to say, overflows, which, however, were things that ought not to exist. This was a difficulty they could only get over by having sewers for sewage and drains for rain water. In this system they had no reservoir to fill. As the sewage went into the ejector, so, by the pumping arrangements, it was sent out again, and the pneumatic ejector only worked when it had work to do. This they had not in any other system. But to continue on the question of reserve power. However perfect the machinery might be, they must have reserve power, but he maintained that the machine of Mr. Shone's was so simple that there was less need of reserve power than in any other system. Nevertheless, he maintained that Mr. Shone must provide reserve power.

Major Fowler said that Mr. Shone explained his system to him very fully at the Society of Arts, at the recent conference, and he then came to the conclusion that the system was one worth looking into very seriously, and after what he had heard and seen that day, he thought the ejector extremely simple, and there was an absence of any jarring parts. Therefore, in regard to the first resolution, he agreed. In regard to the second, that it was extremely applicable to low-lying districts, he also agreed. In regard to the third resolution, he thought they went back to the question of storm overflows, those wretched things which are fatal to the purification of our rivers. Col. Jones did not relieve Wrexham of all its sewage. He only took a portion of it. He had only one or two farms in his water-shed where they took the whole of the sewage, and that was where they had the 'separate system', and until they had this system he was sure they would not be

enabled to get the rivers pure. In regard to 'reserve power', he said he knew a town, the authorities of which laid out a system, and he told them they must have duplicate machinery, and he thought such was absolutely necessary in all good arrangements. The other day, on lowering the river, they found that an immense dock was filled with matter, and instead of six feet of water there was but four feet, with two feet of sewage. This had arisen from a breakdown in machinery at different times, and the sewage being allowed to escape over the storm overflow, and the total absence of 'reserve power'. In Mr. Shone's system all these difficulties could be got over, and the ejector only worked when it was needed. He had much pleasure in seconding the resolutions.

Mr. Sturgeon (Bradford) said he would make a few remarks with regard to compressed air, which was such an important factor in Mr. Shone's system. He would first try to show that compressed air was not necessarily attended with that enormous loss which engineers usually assumed it was. There were also ways of producing compressed air cheaper even than steam power, and, when produced, it possessed properties which gave to it many advantages over steam, especially in connection with a system like the present. In Mr. Shone's particular mode of applying compressed air, he avoids many sources of loss, which would be inseparable from the use of steam power, giving him the advantage in point of economy. Mr. Shone said that efficiency should stand before economy in matters of such vast importance to health, and he quite agreed with him, but at the same time he maintained that his system could be applied more economically than any other system he knew of, including the gravitation system, except in circumstances specially favourable to the latter. He continued: In Mr. Shone's system the pressure required was so small that 1 per cent. per mile would be ample to allow for loss from friction and leakage in the pipes, and from 20 to 30 per cent. loss in compressing. The friction of air in the ejector might be left out of the calculation altogether, as it was very slight—some low decimal of an inch of water at most. The pressure required was so low in Mr. Shone's system that the loss in compressing air would really be no greater than the frictional loss in pumping machinery or other machinery driven by steam. There were many cases in which steam power in Mr. Shone's system might be entirely dispensed with, and they may utilise either the local water supply for air compressing, or they might break the head of the water supply to the town by compressing air, or, as Mr. Dunscombe suggested at a recent meeting, they might use the power to be obtained at the steeper gradients of the sewers to compress air for the lifting power required at other parts. Comparing Mr. Shone's system with pumping, he said there were in each case two working engines—with the pumps there was the steam piston driving and the pump piston driven, with a loss of something like 35 per cent. Mr. Baldwin Latham gave the loss at something like 50 or 60 per cent., and these figures came more within his own experience. In the case of the ejector there were also only two working engines, the steam piston driving and the air piston driven, with a loss of something like 20 or 30 per cent., but with nothing like the amount of friction involved in the pump, and no loss from momentum. The ejector itself could not be called an executive engine, as the only thing about it which moved was simply the piston valve, which could be pushed over by a touch of the finger, and that only moved about a dozen or so times a day, and a few times during the night, and thus let in upon the sewage the silent frictionless air piston without any destruction of force. The compressed air may be said to be a kind of aerial connecting rod or shaft, which had the capacity of moving or turning in any direction, and at any distance from the steam engine which drives it. By it the main engine was made to transmit its force like a many-armed Briareus, setting its paw on any spot wherever power was wanted. In this way one single central engine supplied its force to any number of remote points. In Mr. Shone's system there was such a great saving in the first cost, by the avoidance of deep cuttings and large sewers, that, after allowing a wide margin for the cost of erecting and capitalised cost of working expenses for the motive power, even putting it at its most extravagant figure, the ultimate cost was far below the old system.

Mr. Haldane (M.E., Liverpool) had much pleasure in saying that he hardly thought the mechanical arrangement of the ejector could be more simple than it was. With the greatest confidence he would say that Mr. Shone had done his best to bring this matter into the most practical and simple form, and he did not see how it could be altered for the better. He had seen it at work, seen its results, and he must say that he believed it would be a great success, and result in great benefit to the country.

Dr. Eyton Jones (J.P., Wrexham) said, one point in connection with this system was that if they had sufficient fall from the houses to the reservoir alongside the ejector, they got rid of the possibility of any gas reascending into the houses and polluting them, which constantly took place in all other systems. At their infirmary they had fever wards, and if the excreta therefrom were not properly disinfected, disease was carried down the whole system of sewers, and poison emanated from the exhalations which took place. In this system, also, they had the further advantage that whilst the sewage was progressing through the town they had no man holes through which to admit any gases which resulted from decomposition—in fact they had no decomposition, owing to the rapidity with which the sewage was driven, it being carried away before decomposition took place. Therefore, in all towns this system should be introduced, if simply on the score of health. They had in it one of the most ingenious and one of the most valuable discoveries that any person could have produced.

Dr. Edward Williams (Wrexham) also bore testimony to the effectual working of Mr. Shone's system. He could not go into the low lying districts and see them pouring the sewage into the sea without feeling sorry for the people assembled there. They had gone there to seek health and strength, and sewage was thrown into the sea before their eyes. Were Mr. Shone's plan put into operation, the sewage may be driven up into the surrounding country to irrigate it.

Mr. Leeke (of the firm of Messrs. Maxwell and Leeke, Berry) said, as one who had studied Liernar's system, that for many years he had been considering this subject, and he had tried to find out something similar to what Mr. Shone had discovered, and when he saw this invention he was struck with its ingenuity, and he thought the system most admirable, especially for sea-side places, where it would confer an inestimable boon.

The Chairman put the resolutions to the meeting, and they were carried unanimously.

A vote of thanks to the chairman concluded the meeting.

SANITARY PAINTS.

THE sanitary importance of the provision of non-poisonous pigments instead of the ordinary white paint, of which white lead is so large a constituent, can hardly be overrated or too often insisted on. The extensive use made of white paint in our houses and shops, for our ships, and, in fact, for all the manifold uses for which this pigment is in large demand, render it of the last importance that this cheerful and cleanly adjunct to our civilisation should certainly be innocuous and not productive of disease and death, either to the artisan whose business it is to apply it to various surfaces in the course of his daily work, or to the inhabitants of the structures which are covered with it. The deleterious effects of white lead are now too well known and appreciated to need enlarging on; we may, however, note *en passant* that but very recently, in the course of an application for relief to one of the East London vestries, in consequence of the illness of a relative of the applicant's from white lead poisoning, it was stated that there were several cases of illness arising from the same cause in the London Hospital, although in the factory where they originated every known precaution is used to prevent the deleterious results determined by white lead.

Having regard to these and other facts of the same character constantly cropping up, both in public and private experience, we feel it a duty to again call attention to Mr. Griffiths's 'Patent Zinc White' as a proved non-poisonous substitute for the ordinary white paints of commerce. We have already chronicled the fact that the Sanitary Institute of Great Britain has, with admirable judgment, awarded the special Richardsonian Gold Medal for the best sanitary invention to Mr. Griffiths, for his 'Patent Zinc White', as a substitute for carbonate of lead, and that it was presented to Mr. Griffiths by the Duke of Northumberland, the President of the Sanitary Institute, on the occasion of the meeting held at the Royal Institution on the 10th ult., when his Grace made the true and appreciative remark with reference to this paint, that 'it was the most beneficial discovery ever made for preventing the dreadful suffering caused by the use of lead paints'.

We feel that we owe our readers no apology for placing before them the statement made by Mr. Griffiths at the anniversary dinner of the Sanitary Institute, embodying as it does the practical facts connected with his life-saving invention. After expressing his thanks for the honour which had been conferred upon his firm and himself by the presentation of the Richardsonian Medal, Mr. Griffiths went on to say that, gratifying as it was to receive such a special token of merit from the Sanitary Institute of Great Britain, the award was as nothing in comparison to the satisfaction he felt at having been instrumental in saving the lives and preserving the health of so many of his fellow creatures. He was glad to say that his endeavours to produce a complete substitute for the pernicious white and red leads used so universally in houses and ships, had been appreciated not only by the English, but also by foreign governments, whose demands for his patent paint had shown that they were quite alive to the advantage of sanitary reforms, more especially when such could be combined with economy. The new zinc, or, as it was now generally known in the market, 'Griffiths' Patent White', would do even more work than the poisonous carbonate of lead, and could be produced at quite as cheap a rate per ton. At the same time it had a covering power or 'body' of more than double that of carbonate of lead or oxide of zinc, and therefore consumers, even supposing they had no sympathy with the cause of sanitary progress, would not be sacrificing economy by the use of his paint. He had felt, indeed, that it was of no use for him to produce a sanitary pigment to supersede lead unless it was one which was capable of doing all that carbonate of lead could possibly do, and his aim had ever been to combine commercial economy with sanitary reform. In thanking the institute for the other medals which it had awarded to his firm for Silicate and other sanitary paints and colours he had introduced, he would only say that the Silicate Paint Company was now doing all in its power to supplant lead pigments by the energetic introduction of non-poisonous paints, and to show that it was in earnest in the work, he would mention that it had already spent upwards of £25,000 in the erection of new paint works on the banks of the Thames. These works were producing 100 tons per week of purely sanitary paints, which he hoped would do much to diminish the suffering daily caused by the use of pigments containing salts of lead, arsenic, or other poisonous ingredients. In this hope we cordially concur, feeling convinced that such a consummation will avert much suffering from our artisan class, and, though last not least, save considerable cost to that meekly suffering body, the ratepayers of the kingdom, by preserving the health of a large body of bread-winners.

HABITUAL DRUNKARDS.

AT the general meeting of the Society for Promoting Legislation for the Control and Cure of Habitual Drunkards, Lord Shaftesbury, the president, in the chair, the report read by Mr. Stephen S. Alford, honorary secretary, stated that as the Act would be in force for only ten years, and as its application was limited to voluntary effort, the committee felt the urgent need for the society to redouble its efforts to prove the measure a success, and thereby to secure an indefinite prolongation of its operation, and the addition of strong enabling powers to municipalities and other local authorities. It would also be the duty of the committee to stimulate extensive efforts, both public and private, to establish 'retreats' under the Act for the control and curative treatment of habitual drunkards, and especially to aid in originating some such institutions, on a large scale, for the reception of police-court and other confirmed drunkards. Dr. Norman Kerr read the balance-sheet, which showed a balance from 1877 of £16, and subscriptions of £138, a small sum remaining in hand from the total of £154 received. In moving the adoption of the report, Mr. W. T. Charley, M.P., referred with satisfaction to the very small cost at which the important objects this society had in view had been achieved. Dr. Alfred Carpenter then moved a resolution, to the effect that the meeting was of opinion that a vigorous effort should be made to promote the establishment of typical institutions suitable for the treatment of all classes of habitual drunkards. As this Act was to continue only for a term of ten years, it was not likely that any institution for the treatment of these cases would

be established as a commercial enterprise; yet it was necessary that some means should be taken by which the Act might be proved to be a step in the right direction. In many of these social matters permissive legislation, if found beneficial in its effects, was followed by compulsory legislation. One of the great difficulties they had to contend against was a fear in the minds of legislators that private persons might get people under their control for purposes of gain. This society would, therefore, do well to seek to encourage the formation of institutions which should be above suspicion on this ground. He had in his mind the idea of institutions like an asylum at Northampton, which was under the management of a committee, formed of men of good position, who derived no pecuniary benefit from it, and superintended by medical men of high standing, whose only object was to make as many cures as possible. In time such institutions might be made self-supporting. The evidence of the possibility of curing habitual drunkards which might thus be gained would be most valuable. Dr. Grindrod, of Malvern, agreeing with Dr. Carpenter that the formation of such model institutions was desirable, and speaking from an experience of forty years in the treatment of such cases, pointed out certain arrangements which would be essential to success. He was convinced that it would not do to mix persons of different classes of society, and provision must be made to occupy and amuse the minds of those who placed themselves in the institutions. Possibly some handicrafts might be profitably followed. Canon Ellison, pointing out that the disease to be cured was both physical and moral, said it would be essential that religious influences should be brought to bear from the first on those who were to be cured in these institutions. He believed that by appealing to the religious portions of the community, funds might be obtained for the formation of such institutions. The chairman said that, although this had been regarded by both Houses of Parliament as an experimental measure, if they could make the Act operative, and show that this was no ideal matter, but something real and substantial, they would be allowed to go a great deal further than they were at present.

EPIDEMIOLOGICAL SOCIETY.—VACCINATION.

At a meeting of the Society, held at University College, Gower Street, the President, Surgeon-General John Murray, M.D., in the chair, Dr. Cory read a paper entitled, 'Details of Experiments on the Vaccination and subsequent Removal of Supernumerary Fingers, apparently showing the Imperfect Protection afforded by Vaccination when the Vesicles are Removed before their Full Maturity', of which the following is an abstract.

The number of cases experimented upon were four. Three of the children had supernumerary thumbs; the other had a supernumerary little finger. The thumbs were vaccinated and cut off, one on the sixth day, one on the fifth day, and one on the fourth day, after vaccination. Re-vaccination was performed in all these cases from 39 to 56 days after the primary.

There were two results of these experiments which were noticed. The first was an areola, which existed on the hand from which the digits had been removed on the eighth day after vaccination. This might of course have arisen from the irritation of the wound, but if not, it must have been due to the same causes as those which lead to the development of the areola after ordinary vaccination. The second result, viz., that noticed in regard to the *re*-vaccination of this case, was the most important.

The child whose thumb was removed on the sixth day was found proof against re-vaccination. All the three other cases took, but the course of the vaccination differed very materially from a primary vaccination. The course was very rapid; the areola developed on the sixth and seventh days, instead of on the eighth or ninth. The scabs formed early, and most of them were desiccated by the twelfth day. In these particulars, and also in the appearance of the vesicles, these vaccinations presented great similarity to ordinary cases of re-vaccination.

It is well known, from Bryce's test, that when a second vaccination is performed on the fifth day after the primary, the vesicles which result run a rapid course, so that they overtake the primary vesicles, and both mature together.

The same thing happens when the second vaccination is done later than the fifth day, as the following case proves. A child was vaccinated in four places on the right arm. On the seventh day afterwards it was vaccinated in another place on the left arm. For the next five days a place was vaccinated daily. It was found that the places vaccinated on the seventh, eighth, and ninth days after the primary vaccination took, but those done on the tenth, eleventh, and twelfth days did not take. On the fifteenth day all the scabs on both arms were desiccated. The ninth day after the primary vaccination was in this case the latest day any result could be obtained by a fresh insertion of lymph, and this is precisely the result which Trousseau had observed in his experiments mentioned on page 21, vol. i, of his work on Clinical Medicine (3rd French edition). As the vaccine vesicles usually increase in size up to the ninth day, but not afterwards, it is seen that the last day we can vaccinate with effect is also the last day the vesicles increase in size; and this is what we might expect, for the vaccine vesicles will increase in size until the skin has undergone that unknown modification which renders it incapable of being further affected with the vaccine virus. When this has taken place, the vesicles cannot spread.

Now, suppose in one of the above experiments we had vaccinated the child in another portion of the skin on the same day we amputated the fingers. What would have been the result? Probably this: that the second vaccination would have run a rapid course, just as we have seen how it would have done if the primary vesicle had not been interfered with.

From these considerations it seems probable that the modification, whatever it may be, which renders the system incapable of further infection with the vaccine virus is a progressive one, commencing at the time, or shortly after, the first insertion of the virus, and goes on hand in hand with the development of the vesicles. What the experiments seem to show is that this progressive modification is arrested when the vesicles are removed, and that when vaccination is again performed the modification already partially accomplished proceeds to completion from the point at which it had arrived when arrested. We can, by the foregoing supposition, explain the likeness which we have seen to exist between the re-vaccination after the above experiments and ordinary re-vaccination, for the modification wrought in the system during the course of a

primary vaccination, being supposed to be progressive, and the return of the system from a state of perfect protection to its original condition. Being known to be progressive, we should expect that a vaccination performed either when the modification had been arrested half way, or when the modification had half passed off, would give rise to similar phenomena.

It seems probable that not only complete removal of the vesicles, but also those conditions of the skin, such as eczema, which often cause considerable modification in the appearance of the vesicles, may be operative in arresting the modification of the system; and if this be so, we would have an explanation of some of those cases in which small-pox has early followed vaccination, as well as the reason why, with slight scars, the protection against small-pox is not so great as when the scars are well marked, for a slight scar may very well be taken to indicate that the vesicle which gave rise to it did not attain its full development.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF LORDS.

(*July* 22.)

STREET ACCIDENTS.

Viscount Templeton called attention to the enormous increase in the number of street accidents in the metropolis during the year 1878 as compared with previous years.

Earl Beauchamp said the return for 1878 included thirteen months, and thus accounted for an apparent increase, there having really been a diminution in the total if allowance were made for this and for the increase in the number of the population.

(*July* 29.)

CANAL BOATS.

The Archbishop of Canterbury said that it had been ascertained that no fewer than 100,000 persons were living in canal boats, and in 1877 an Act was passed with the view of improving the sanitary and educational position of these people. He, therefore, asked the Lord President of the Council whether there was any objection to laying on the table of the House a report of the proceedings which had been taken since 1877 under the provisions of the Act 40 and 41 Vict., cap. 60, for the registration of canal boats used as dwellings and the education of the children dwelling therein.

The Duke of Richmond and Gordon said that the annual report of the Local Government Board for last year would shortly be in the hands of their lordships, and it would contain an account of the proceedings taken under the Act relating to canal boats. That Act was passed in 1877, but it only came into operation last year. The Local Government Board had issued regulations regarding the registration of the boats in respect of their number and of the number of persons whom they were to accommodate, and also defining the authorities who were to have charge of the work of registration and the districts in which the boats were to be registered. The number of districts was ninety-nine. Boats had already been registered in sixty-two out of ninety-nine districts. The total number of boats registered was 4,964 and that of the persons for whom there was accommodation 22,206. It would be impossible to produce any detailed information on the question of education at the present moment. He laid on the table the returns received by the Local Government Board with regard to the registration of the boats and the numbers to be accommodated on board.

HOUSE OF COMMONS.

(*July* 14.)

CHURCHYARDS.

Mr. Cross, replying to Sir G. Jenkinson, had no doubt that a considerable number of churchyards were over full; but some time ago it was found that a useful return could be obtained only at an expenditure of £5,000 or £6,000, and the Government did not feel justified in putting the country to that expense. He had no power, when a churchyard was full, to enlarge or to close it.

THE ARTISANS' DWELLINGS ACT IN THE METROPOLIS.

Sir J. M'Garel Hogg, replying to Mr. Fawcett, stated that it was impossible to say what would be the entire cost to the metropolitan ratepayers to carry out the above Act. There were many cases before the Metropolitan Board in respect to which schemes had not yet been prepared or estimates made. Up to the present time, of fourteen schemes approved by Parliament, the loss on six sites would be £562,061, while that on the remaining eight was estimated at £514,409.

(*July* 28.)

THE NOXIOUS GASES BILL.

Mr. Sclater-Booth announced the intention of the Government to withdraw this Bill.

THE LOCAL GOVERNMENT BOARD (IRELAND).

On the vote of £127,626 in Committee of Supply for the Local Government Board (Ireland), Mr. M. Henry complained of the administration of the Irish Local Government Board, and urged the necessity of an inquiry into its composition.

Mr. Gray denied that the Local Government Board commanded public confidence, and supported the suggestion for an inquiry into the constitution and management of that board.

Mr. Lowther defended the present system under which the Irish Local Government Board was represented by him in the House of Commons. He intimated, with reference to the various criticisms offered on the scope of that Board's duties, that an interchange of some duties would by-and-bye be effected between that Board and the Board of Public Works, in consequence of the reorganisation of the latter department. He was anxious to pass a Vaccination Bill this year. Some hospital grievances to which reference had been made would be investigated.

The vote was agreed to.

(*July* 29.)

VACCINATION PROSECUTIONS.

Mr. Sclater-Booth, in reply to Mr. Serjeant Simon, said,—I am aware that proceedings have been taken lately against a large number of persons in the Dewsbury union for neglecting to cause their children to be vaccinated, and I fear they may have been en-

couraged in that course by those who are intrusted with the administration of the law. Proceedings are taken under three heads:—First, for a penalty for neglect to have the child vaccinated; secondly, there may be a summons to show cause why an order should not be made for the vaccination; and, third, there may be a summons for a penalty for non-compliance with the order. The vaccination officer has written to me, stating that in no single instance has he taken proceedings under the third head against a defaulter previously convicted under the first. That being so, his conduct has not been contrary to the instructions of the Local Government Board, nor to the spirit of the letter to the Evesham Guardians. No doubt it is contrary to the resolution of the Dewsbury Guardians; but that resolution, as they have been informed, is illegal, and, in fact, a nullity. There seems to me no ground for putting an end to the system of payment of the vaccination officer by fees, which has been generally adopted and works well, nor is it found to encourage prosecutions. The fees are not regulated by the number of prosecutions, but by the number of cases of successful vaccination.

(*August* 1.)

THE SANITARY CONDITION OF MALTA.

Mr. Plimsoll called attention to the condition of Malta, of which, from his personal experience, he drew a deplorable picture (SANITARY RECORD, vol. x, p. 39), attributing it to the unwise and inequitable system of taxation. As a remedy he moved a resolution declaring that the cost of draining, lighting, and watering should be paid out of a tax on property, and that such steps as may be necessary should be taken to secure the abolition of the taxes on food in Malta.

Mr. Anderson, in supporting the motion, urged the necessity of appointing a Civil Governor and an enlargement of the franchise.

Sir M. Hicks-Beach said there was much in Malta which required improvement. Since he had been in office he had done much for the sanitary improvement of Malta, and it was chiefly owing to the opposition of the elected members of the Council that the passage of a Public Health Bill had been delayed. With regard to the Bread Tax, he was waiting for the opinions of these members to take it into consideration, and he appealed to the House not to fetter his hands by passing a resolution which Mr. Plimsoll had not shown was in accordance with the wishes of the people, and which would not carry out his object.

The motion was negatived.

According to a writer in the Chicago *Pharmacist*, the United States Government having recently applied to the German Government for information as to the number of patent medicines and the extent to which they were sold in Germany, a polite reply was sent, that as that country was now civilized, patent medicines had no existence in it.

The execution of the sewerage scheme for Prudhoe, in the district of the Hexham Rural Sanitary Authority, which had been impeded through the high terms demanded as rent for land belonging to the Duke of Northumberland, is about to be commenced. The scheme has been modified by the engineer, Mr. John S. Hodgson, Hexham, so as to place the outlet and irrigation works upon the land of another proprietor.

REPORTS OF MEDICAL OFFICERS OF HEALTH FOR COMBINED DISTRICTS.

MIDDLESEX AND HERTFORDSHIRE.—Dr. C. E. Saunders, who serves this combination, is one of the best paid, as he is certainly one of the ablest medical officers of health in the kingdom. He receives for his services a salary of nearly £900, some of his authorities not accepting the Government subsidy. A small allowance is made for laboratory expenses, but for nothing else. The district, which is described as in a ring fence, and easy of access from all parts, comprises the Barnet, Berkhampstead, Hemel Hempstead, Hendon, Watford, and Welwyn rural; and the Barnet, East Barnet Valley, and Tring local board districts. Its area is 182,347 acres, and its population about 126,380. In common with other combined districts, there are several local boards in the area which are not in combination. This is very unsystematic, as we have before pointed out; and it acts injuriously to the combined medical officer in many ways. Nor must it be forgotten that, in many cases, it results in a severe pecuniary loss to him: for where, as in this district, three parishes, Hendon, Finchley, and Willesden, formerly supervised by Dr. Saunders, have been formed into urban districts, and these new districts have not appointed Dr. Saunders as their health officer, this must mean a gradual sapping of his income. We have carefully perused all Dr. Saunders' annual reports, and have no hesitation whatever in cordially endorsing the whole of his action. The reports are models as regards the record of sanitary works accomplished and required; and we can only suggest a more extensive and systematic comparison of the vital statistics with those of former years, and an improvement as regards the meagre details at present given as to the circumstances of the outbreaks of disease reported. Dr. Saunders' district is eminently one which should afford many cases of great etiological interest to sanitarians at large; and it may be worth consideration whether some fuller details as to particular cases of infectious disease would be thrown away. Dr. Saunders commences his report for 1878 with a review of sanitary legislation since 1872, as to which we need say nothing, except that he has fallen into the common error of supposing that sanitary authorities, as such, have anything to do with Sect. 34 of the Contagious Diseases (Animals) Act of last session. On the subject of sewerage and drainage, Dr. Saunders emphasises the care which should be taken by individual householders with regard to the perfection of house-drains, the ventilation of soil-pipes, the proper arrangement of the water supply, etc., and proceeds to comment on the argument of expense brought against schemes of sewerage. It is satisfactory to find that in the district four schemes of sewerage have been carried out, and that seven more are contemplated. As regards water supply, part of the district seems to be well off; but there are still many places, particularly Potters Bar, South Mimms, and East Barnet Valley, where a general supply is very urgently needed, and to which the mains of some existing water company could, with comparatively little expense, be extended. Since his appointment, Dr. Saunders has analysed 528 samples of water, with the result of showing that 193 were good, 211 bad, and 124 were doubtful. The preponderance, however, is now in favour of the good waters, the bad ones having been replaced by water from another

source, and the cause of the pollution ascertained and removed. Some of the cottage accommodation is very dilapidated and filthy, and more cottages, of a better class, are one of the great wants of the district. Considering the proximity of the district to the Metropolis, and the increasing number of Londoners that annually take up their residence within it, it is highly important that sanitary action there should be energetic, and the details given in the several reports show that there is ample room for improvement in this respect. Another point on which Dr. Saunders very properly dwells, is the almost complete absence in the district of means for isolating cases of infectious disease. We trust that his arguments, which are very sound and good, will have their due effect with the authorities concerned. During the year 1878 there were 3,681 births, and 2,040 deaths in the district, giving rates of 32.2 and 17.8 per 1000 respectively. Of the total deaths, 27.1 per cent. were of children under one year, and 9.4 per cent. were due to zymotic causes. The general rate for 1877 was 15 per 1000, and the increase is no doubt due, to a great extent, to the exceptional severity of the weather. The death-rates for the several districts ranged from 14.6 in the East Barnet Valley district to 21.4 at Barnet, and 27.6 at Tring, where sewerage is much wanted. The highest death-rate amongst the rural districts was at Hemel Hempstead (18.3), the lowest at Watford (15.6). No zymotic disease seems to have been particularly prevalent; but there were epidemics of scarlatina at Rickmansworth, Bushey, and Sudbury; of whooping-cough at Tring, and of diphtheria at Friern Barnet. The minor details of sanitary work seem to have been well sustained. Every report speaks of overcrowded houses being remedied, and of a large number of houses being cleansed and disinfected.

HEREFORDSHIRE.—This is one of the two combinations in which a sanitary authority, declaring itself unwilling to remain in combination, has been compelled to do so by an order of the Local Government Board. The whole of Herefordshire is not, however, comprised in it, the Dore Rural, Kington Rural and Urban, Leominster Urban, Ross Rural and Urban, having preferred to elect their own officers. The area of the combined district is 285,461 acres, and the population 80,631. The authorities combining are the Bromyard, Hereford, Ledbury, Leominster, and Weobley Rural, and the Hereford Urban. Dr. Sandford's salary is £700 per annum, and he is required to devote his whole time to the performance of his duties. Remembering that the Local Government Board exercised in this case the exceptional powers given to them by section 286 of the Public Health Act,—powers which they have declined to exercise in some subsequent and more important cases, we have gone with some little care into the several reports of Dr. Sandford, with a view of seeing whether there were in fact any particular circumstances in the district that should induce the Local Government Board to take an exceptional course with regard to it. We cannot profess, of course, to be judges of Dr. Sandford's work; but his reporting is not of the kind that inspires confidence. The style is loose, slipshod, and inflated, and there is a lamentable lack of that exactitude in reporting outbreaks, which every combined medical officer of health should consider himself bound to adopt. This, however, is not a subject on which we feel we have a right to comment at any length, as it is the matter rather than the manner that is the more important. Dr. Sandford evidently makes periodical reports to his authorities in supplement to his annual reports; but as these are not printed, it is often difficult to gather what sanitary progress is actually being made. We have already expressed our opinion on this point in our observations on Dr. Britton's reports (see p. 30), and we trust to find fuller particulars on these subjects in future years. Coming now to the report for 1878, more especially, we observe that there is no account of the general sanitary progress of the district, nor any comparison of the statistics (especially those of preventable diseases) with those of former years. The prefatory matter is taken up with a transcript of the Public Health (Water) Act, and of the conclusions of the Rivers Pollution Commissioners as to the merits of water from different sources. In one respect, indeed, Dr. Sandford's action is to be warmly commended. He has organised, on the plan of Dr. Bond, a house-to-house sanitary survey of every place in the district, and has now commenced the third of such surveys. We could have wished that the general results of these surveys, and the improvements consequent upon them, had been given by Dr. Sandford, as it is not easy to judge of the results when given in a fragmentary form. But we have no hesitation in entirely approving the idea of a sanitary survey, which must necessarily bring to light many deficiencies that would otherwise remain hid. It cannot be denied that a very considerable diminution in the death-rates of the respective districts has been observed since the Public Health Act came into operation, and they are now all satisfactorily low, none being higher than 16.38 (Hereford Urban), Leominster Rural having a rate of 12.09. As we have already stated, no statistics are given as to the district as a whole, and the decrease of preventable diseases cannot therefore be stated. But from what Dr. Sandford says, they are undoubtedly on the decline, and, as a matter of fact, but few outbreaks of infectious disease are reported. The most serious of these appear to have been an outbreak of so-called 'camp fever', at Yarsop, from which Dr. Sandford himself suffered, outbreaks of diphtheria at Bishopstone and Marcle, and a remarkable mortality (20 deaths) from pulmonary diseases in the Bishops Frome district. In Hereford City, illegitimacy is reported to be on the increase, no less than 33 out of 480 births in 1878 being illegitimate. An improved water supply seems to be the great sanitary want in the district, as great deficiency at many of the villages is reported. Much improvement is, however, expected from the operation of Mr. Brown's Water Act of 1878. It is only fair to Dr Sandford, as perhaps accounting for some of the deficiencies to which we have adverted, to explain that for a considerable period last year he was suffering from 'blood poisoning, arising from an attack of enteric and scarlet fever', contracted whilst carrying on his official duties.

The Tottenham Local Board have adopted a scheme for an increased water supply for their district, prepared by Mr. De Pape, the engineer. This is the only Local Board of Health in the neighbourhood of the Metropolis having the water supply in its own hands, the water being at present supplied from Artesian wells to about 25,000 of the 40,000 inhabitants of the district. The new scheme embraces the construction of a covered service reservoir, a tower tank, delivery main from the reservoir and tank to the High Cross, and an additional set of three throw pumps in the well at the waterworks, at an estimated outlay of £8,000.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

COMMONS.

1878. *Metropolitan B. W.* v. *Stoner.* "Metropolitan Commons Act, 1866."—Action for trespass—Prescriptive rights—When a tenement confers a right of common of pasturage, if the tenement is divided the right does not cease, but becomes divided also. (*Times*, Nov. 28, and Dec. 21, 1878.)

RATING OF INSTITUTION.

1879. *Institution of Civil Engineers* v. *St. John's, Westminster, Overseers.* 6 & 7 Vict., c. 36—Institution duly certificated under the Act—Held, nevertheless, that it was not entitled to exemption, science not being an exclusive purpose of the Institution, it dealing with matters of practical benefit to persons engaged in engineering pursuits. (43 J.P., 96.)

POWERS AS TO DRAINS.

1867. *Rhodes* v. *Thomas.* "General Turnpike Act, 1822," s. 118.—Orchard abutting on road; access to it obtained by the construction of a roadway over an intervening ditch, pipes being put in the ditch.—Flow of water partially obstructed, notwithstanding the pipes—Held that the occupier was rightly convicted of obstructing the ditch.—(31 J.P., 117.)

SURVEYOR OF HIGHWAYS.

1866. *Reg.* v. *Dix.* "Highway Act, 1835," s. 7.—*Quo warranto* lies for usurping the office of Surveyor of Highways. (30 J. P., 390.)

RATING OF WATERWORKS.

1879. *Reg.* v. *St. Mary, Islington, Assessment Committee.* Additional street mains not immediately productive held rateable at an increased amount so soon as they became productive by new houses being connected with them. (48 L.J., M.C., 123; [*Reg.* v. *New River*] L.R., 4 Q.B. D., 309; [*New River* v. *Islington*] 40 L.T., 322; 43 J.P., 349.)

PARTY WALL.

1879. *Knight* v. *Purssell.* "Metropolitan Buildings Act," 18 & 19 Vict., c. 122—Definition of "party" wall.—A wall with a shed on one side and water-closets on the other held to be a party wall to the extent in height and width that the closets and shed were conterminous. (48 L.J., Ch., 395; L.R., 11 Ch.D., 412; 40 L.T., 391.)

DEFAULT OF OWNERS.

1879. *Reg.* v. *Swindon L. B.*—"Public Health Act, 1875," ss. 150 and 257.—When works are executed by a Local Authority because the owner makes default in complying with an Order, and the property changes hands during the proceedings, the owner at the time when the works are completed is the person to be sued for the expenses. (48 L.J., M.C., 119; L.R., 4 Q.B.D., 305; [*Hinton* v. *S.*] 40 L.T., 424; 43 J.P., 431.)

VESTRY MEETINGS.

1879. *Reg.* v. *Tottenham, Vicar.* Application for a *Mandamus* to a Vicar and Churchwardens to place a notice on an "agenda-paper" that a proposed Vestry Meeting would be invited to fix the hour for future meetings—Application refused—A vestry is a fluctuating body, and for one set of ratepayers to attempt to bind another would cause great confusion—The officers who are entitled by law to call vestry meetings are entitled to fix the time.—(48 L.J., Q.B., 407; L.R., 4 Q.B.D., 367; 40 L.T., 255; 43 J.P., 236.)

ARREARS OF RATES.

1850. *Wetherell, in Re.* Arrears of Poor Rates due from a bankrupt are proveable.—Certificate held a bar to the levy of the amount by Distress and sale of after-acquired goods.—(19 L.J., M.C., 115; [*Burwash, ex p.*] 4 New Sess. Cas., 93; 1 L.M. & P., 60.)

SEA-SHORE.

1878. *Reg.* v. *Commissioners of Sewers for Sussex.* 3 & 4 Vict., c. 22—Sea-bank partly washed away—Default of Commissioners to repair, on the ground that the cost would be out of all proportion to the public benefit—*Mandamus* granted for the Commissioners to repair, the merits of the case to be argued on the return of the writ.—(*Times*, June 25, 1878.)

COMMONS.

1879. *Booth* v. *Inclosure Commissioners.*—Village greens, long used for exercise and recreation, inclosed by the Commissioners in the usual way.—Action to try the right not brought within the 12 months limited by the "General Inclosure Act, 1845", 8 & 9 Vict., c. 118, sect. 165—Held that the Action was irregularly brought and must be stayed; it was too late to impugn the proceedings of the Commissioners, whether they were right or wrong.—(*Times*, Feb. 4, 1879.)

VILLAGE GREENS.

1878. *Cowper (Earl of)* v. *De Morgan.* Waste land allotted to plaintiff and inclosed accordingly—Claim of right on the part of defendant and others to the unrestricted use of certain of the inclosed lands for games—Held that there was no sufficient evidence of user of the ground for general purposes of pastime; in fact, of nought else but a precarious and permissive user—Perpetual injunction granted to restrain defendant from interfering with the inclosure. (*Times*, Dec. 17, 1878.)

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE VENTILATION OF DRAINS.

THE letter from Dr. Blake upon this subject, at page 34 of your issue for July 15th, does me great injustice, and contains various mistakes or misrepresentations. He states that I, in April 1875, patented the ventilation of that portion of the house-drain between the trap and the sewer, and that he asked me various questions on the subject, which I declined to answer, and even to one gave him 'no reply'. I beg to state that I did not, in April 1875, patent the ventilation of the drain beyond the trap, for the right to do so belonged to the public. I only showed the public a way of doing so, in connection with the use of my new patent trap. Further, as I stated in the reply which I did send to Dr. Blake, the ventilation of the drain beyond the trap existed at Dr. Fergus' house at least since August 1874; while, in the *Building News* for August 1873, I told him a drawing of mine would be found, showing a ventilation pipe put in from beyond the trap, and carried up above the ridge. As to who first ventilated the outer side of the trap, I told him I could not say; neither could I remember how long before 1873 I

had either done it myself, or recommended it to be done. However, to give him more information on the subject, I sent him, several weeks ago, a printed copy of a paper, read by me to the Philosophical Society of Glasgow in March of this year, (it will appear in the proceedings of the society), in which the very first drawing is a sketch of Mr. John Honeyman's trap, invented, as I explained, in 1858, for the express purpose of ventilating the sewer, or the drain beyond the trap. W. P. BUCHAN.

VENTILATION OF THE UNDERGROUND RAILWAY.

I NOTICE the important subject of the ventilation of the Underground Railway is alluded to in the SANITARY RECORD of July 15th. A gentleman who appears to have some scientific knowledge has told me that the great difficulty is with the heavy gases which sink to the bottom of the roadway, and that the best way to deal with them would be to carry them off by means of a small stream of water kept running into a channel sunk a little below its level. I know nothing of the subject myself, but it seems to me that the suggestion is worth notice. Something certainly ought to be done to relieve so large a portion of our population from the necessity of breathing daily so noxious an atmosphere.

THOMAS D. MARSHALL.

THE REGISTRATION OF INFECTIOUS DISEASES.

I have much pleasure in calling the attention of my professional brethren and the public generally to the following important clauses in the Llandudno Improvement Act, 1879, just obtained. This application was made by the Improvement Commissioners at my request when acting as their medical officer of health, and I trust they will see the propriety of carrying out as soon as possible another equally important suggestion, and erect a suitable Hospital in a suitable situation for the reception and treatment of infectious diseases, for which purpose the owners of the soil have generously offered a piece of land at a nominal rent. It is also worth mentioning, that the Registrar-General has at length kindly consented to do justice to us in the matter of our mortality statistics, and will in future insert a paragraph in his Quarterly Returns, showing the nature and number of deaths occurring in Llandudno proper, apart from the other seven parishes with which Llandudno has hitherto been classed, under the title of the 'Crenddyn' sub-district.

JAS. NICOL, M.D.,
Late Medical Officer of Health.

'The Llandudno Improvement Act, 1879.—Sect. 14. If an inmate of any house or building situate within the district be attacked by any of the diseases hereinafter mentioned (that is to say), small-pox, cholera, diphtheria, typhus fever, typhoid fever, or scarlatina, then, as soon as the nature of such disease has been ascertained, notice in writing in the form to be adopted by the Commissioners, and to be gratuitously supplied by them, addressed to the clerk to the Commissioners, stating the nature of the disease, the name of the person affected, the house or building of which such person is an inmate, and the name of the person being the occupier or having the control or management of such house or building, shall be given by the owner or occupier or other person having the management or control of the house or building of which the person attacked by any such disease is an inmate; or, in the event of the person so attacked being the owner or occupier or other person having the management or control of such house or building, then by the person or persons having charge of such person attacked, and by any legally qualified medical practitioner called in to attend, or attending, any person attacked by any such disease; and any such owner, occupier, or other person, and any legally qualified medical practitioner failing or neglecting to give such notice shall for such default in giving such notice be liable to a penalty not exceeding ten pounds.

'Sect. 15. Every legally qualified medical practitioner giving notice to the clerk to the Commissioners pursuant to this Act of the existence of any of the hereinbefore-mentioned diseases within the district, shall for every case in which he gives such notice be entitled to a fee of two shillings and sixpence, to be paid by the Commissioners.'

DIARRHŒA, A ZYMOTIC DISEASE.

IN my yearly report and tables, forwarded to you, you have noticed that my returns of diarrhœa and the Registrar-General's do not correspond. You are aware that in all printed tables, diarrhœa is classed among the zymotic diseases: now, I think it very unfair to the district, and calculated to give a very false impression of its sanitary condition, to swell its rate per 1,000 of zymotics by the admission of cases of diarrhœa, in many cases certainly dependent on intestinal irritation from dentition, and even in summer diarrhœa, probably due more to this cause than any unsanitary condition of the district in which they occur. The diarrhœa of adults, too, in warm weather, is usually more due to climatic change and unwholesome fruit than any other cause. I think, then, such cases should be referred to their respective headings of 'infantile diseases of dentition', and 'diseases of digestive system'. Of course, care should always be taken in investigating any such cases, that no condition of water contamination or drain infection be overlooked, as no doubt, over and above the causes given, summer diarrhœa is largely affected by such causes: still, you will see I contend for the principle that this is not invariably the case, and that the assumption that it is so is unfair; though, of course, I am open to conviction, if I am proved to have overlooked anything in the argument. J. MAY, Jun., M.O.H., Devonport.

[Opinion is somewhat divided as to the classification of diarrhœa as a zymotic disease, although the greatest epidemiological authorities argue that infantile summer diarrhœa is of zymotic origin. Many deaths, especially of adults, are certified as the result of diarrhœa, which are really due to organic disease, but it is next to impossible to separate them from the rest of the deaths referred to diarrhœa. The great object to be aimed at in the publication of local mortality statistics, for comparative purposes, is to secure uniformity, and thus it becomes important not to depart from the Registrar-General's practice of including diarrhœa as one of the seven principal zymotic diseases. No local injustice can be committed, if all districts are treated alike.—ED.]

THE OXFORDSHIRE COMBINED DISTRICTS.

I SHALL be obliged if you will permit me to explain very shortly the circumstances which led to my ceasing to hold the appointment of health officer to the Oxfordshire Combination of Sanitary Authorities, inasmuch as the reference which you made to them in your recent leading article is calculated to convey an incorrect impression, and one scarcely just to some of those concerned. My re-appointment, at the end of my first term of office in 1876, had been made almost as a matter of course; but, on the present occasion, the joint committee appointed to manage the appointment resolved, by a majority, at their first meeting, that they would have an open election. At the next meeting I intimated, through one of the members of the committee, that I should decline to be a candidate. Thus, if 'the question of my re-appointment was not considered, it was only in consequence of my own act, the committee could not consider the re-appointment of a man who declined to be re-appointed. I have the fullest assurance that it would have been considered, if I had acted otherwise—and indeed it must have been so; for almost, if not quite all, of the actual candidates made it a condition of their application, that I was not seeking re-appointment—an act of courtesy on their part, which I am glad to take this opportunity of acknowledging.

GILBERT W. CHILD.

Charlbury, Aug. 11, 1879.

SANITARY JOTTINGS.

Mr. J. E. Ellison, of Leeds, has been awarded a prize medal by the Sanitary Institute of Great Britain for his patent conical ventilators, described in the SANITARY RECORD, which were selected by the judges at the sanitary exhibition held at Stafford last year to be further tested. These are the only ventilators to which the institute, after practically testing, have thought fit to award a medal. ——The Local Government Board have refused to accede to the application of the Maidenhead Town Council for a loan of £4,000 for street improvements, the Board being of opinion that an efficient scheme of sewerage for the town is the most urgent improvement needed.——The Goole Local Board have decided to proceed with drainage scheme for Old Goole, the cost to be defrayed out of this year's rates.——The first public baths in connection with the Corporation of Leicester have been opened. Their cost, exclusive of the site, is about £10,000. ——A terrible charge is brought against the thrifty citizens of the town of Plymouth, U.S.A., to wit: that they have been despoiling the ancient cemetery, wherein lie the original and only Puritan fathers, of the old gravestones, which they have been using for the eminently practical purpose of drain covers. That, says the American *Plumber and Sanitary Engineer*, is a trifle worse than stopping a bung-hole with the dust of Cæsar, and hopes that the charge is unfounded.——The Vestry of St. Pancras have resolved to pave the roadways adjacent to the University College Hospital, in Gower-street, and the Royal Free Hospital, in Gray's Inn Road, with wood paving, free of charge. The hospital committee and medical staff of the former institution have consequently placed on record 'their appreciation of the great boon conferred upon the patients of the hospital by the humane decision of the Vestry'.——A return just presented to Parliament shows that during the year 1878 the deaths of 3,870 seamen in the British Merchant Service were reported to the Board of Trade. Of these, 415 occurred from fever (185 from yellow fever); 195 from diseases of the lungs, including consumption; 224 from cholera, dysentery, diarrhœa, etc.; and only five from scurvy.——Dr. W. T. Watson, medical officer of health for Tottenham, in his quarterly report, states that for the last three months the annual rate of mortality has been 18.6 per 1,000, and the rate of mortality from zymotic diseases 2.2. Of 185 deaths, one was over 102 years of age; eight between 80 and 100 years; and 36 between 60 and 80 years of age.——Two cases of fever have been admitted to the infirmary at Derby, the mode of conveyance of which shows a great want of forethought. One was that of a man suffering from typhoid fever; he was conveyed in a hansom. The other was that of a child infected with scarlet fever, who was taken through the streets in an open perambulator. Scarlet fever is very prevalent at the present time in the town.——The Liverpool Town Council have decided, by thirty-six votes against eight, in favour of the Vyrnwy scheme of water supply, recommended by the Water Committee in preference to the Hawes Water project.——At a meeting of the ratepayers of Keswick, held on July 17th, it was resolved to purchase the waterworks of the town from the Company for £7,250, the sum agreed upon between the Company and the Local Board, and to apply to the Local Government Board for sanction to a loan of that amount.——A Russian physician, M. Malarevsky, struck by the prevalence of shortsightedness among literary men, proposes that books should be printed in white ink on black paper, and he has made experiments with 50 persons which tend to confirm this view.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

At the Annual Meeting, held on the 9th ult., the following officers were elected for the year ensuing:—

President—Dr. J. S. Bristowe. Vice-Presidents—Mr. J. Liddle, Dr. G. Buchanan, Dr. Thos. Stevenson, Dr. C. O. Baylis, Dr. W. H. Corfield. Treasurer—Dr. J. W. Tripe. Secretaries—Dr. J. N. Vinen, Mr. S. F. Murphy. Council: Metropolitan Members—Mr. G. P. Bate, Mr. F. M. Corner, Dr. T. O. Dudfield, Mr. H. Leach, Mr. S. R. Lovett, Dr. James Stevenson. Extra-Metropolitan Members—Dr. J. Adams, Dr. F. T. Bond, Dr. G. W. Child, Dr. A. Hill, Mr. E. L. Jacob, Dr. R. P. B. Taaffe.

The Devizes Waterworks Committee have decided that the charge for supplying water for domestic use only shall be 5 per cent. on the rental; for trade purposes they will supply by meter, at the rate of 1s. 3d. per thousand gallons, with the additional charge of 5d. in the pound sterling on the rental.

Tenders are to be immediately invited for the construction of about five miles of the main sewer for the drainage of the city of Adelaide, South Australia.

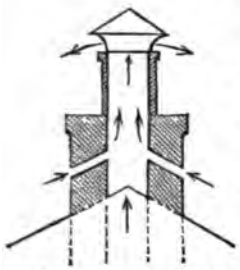
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 38.)

AIR.—XXV.

AIR INLETS (*continued*).—*Rotary Ventilators, etc.*—Before proceeding to this part of the subject, I wish to express my humble opinion that the method of producing an induced current has been independently invented by various people at different times. For instance, I have a proof that it was used in the Isle of Skye at Skebost as far back as 1847, where it was introduced to Mr. Macdonald by Mr. Lockhart as a means of producing a steady up current in the short and straight flues common to the island, and not only this, but the coned and flat top which has formed the subject of several recent patents were made use of at the same date, in order to complete the work which the inlets began.



Induced current applied to flues, with coned top to cap, used in Skye 1847.

The same system of inlet and assisted outlet can also be found in many other primitive forms.

In 1858 Mr. James Howorth introduced his world known Archimedean ventilator, which is based on the celebrated screw of Archimedes, and has proved so successful that at least 5,000 of them, averaging from 6 to 48 inches in diameter, are yearly manufactured by him. Mr. Howorth has made considerable improvement in this ventilator since its first introduction, and at the present moment it is difficult to do justice to the series. The ventilator, however, may be described as worked by a double pitched screw, formed by arranging two blades with helical surfaces on a vertical spindle. Upon the same spindle, and above the screw, is attached a cap of open construction, upon which are overlaid narrow vanes, standing perpendicularly, and arranged on a circumference equal to that of the casing which contains the screw, the whole being finished by an inverted disc-like cover, also provided with vanes, and curving in such a manner as to be impelled by the wind, and so causing the movable part of the apparatus—the screw and the spindle—to revolve. As the cowl revolves, the vitiated air moved upward by the screw finds an escape between the vertical vanes which are, nevertheless, so disposed towards each other, that rain and dust, and ordinary down draughts, are prevented from entering the body of the ventilator.

A B C

Howorth's Revolving Archimedean Screw Ventilator. B, smaller form for soil-pipes, etc.; C, larger pattern for ventilating buildings; A, seating for same.

Great improvements have been made in the seating of the spindle, the lower end of which is conically shaped and hardened, and both the bush at the top of the spindle, and the step at the foot is kept constantly lubricated with suitable oils. As a consequence of this, the ventilator revolves with a minimum of wind, and it is very rarely, indeed, when they can be seen in a stationary condition. For the readier affixment of these ventilators, Mr. Howorth supplies a wooden seating or frame base, constructed of grooved and tongued boards, fixed to the rafters of the roof. When the ventilator has been fixed in this base, or even fixed in any other way, it is necessary to take out the brass screw in the feed tube, and to pour in the prepared oil which is supplied. Any other oil than this is liable to freezing; and experience has proved that a full dose of the oil will last from eight to ten years.

The same pattern of ventilator has been made to revolve by steam, and the screw is driven by this power, when very quick ventilation is required, or when it becomes necessary for getting rid of large quantities of hot air or foul gases. In this case the ventilator is fitted up with driving and loose pullies attached to it, and it is found in this case to be more useful than a fan, as it only requires about a tenth of the power necessary for the latter contrivance. This machine-worked ventilator is largely applied in weaving-sheds, in scutching rooms, and in some of the flax mills it is found that the thick, heavy dust which is present in all hemp and flax fibres, and which forms a constant annoyance to the work-people, is readily removed by its means. It is also largely used in bleaching, dye works and print works, in chemical works, and in fact everywhere where the expulsion of vitiated air becomes imperative. In churches, chapels, schools, and in baths and wash-houses they have been found equally serviceable.

Howarth's Archimedean Screw Revolver, fitted for steam or other power, in order to remove gases, dust, etc.

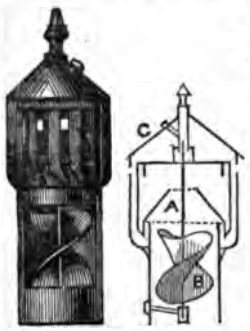
It is sometimes necessary in the case of ornamental buildings to surround the screw and vanes with some architectural casing, and this is achieved in a variety of ways. The screw is made to revolve in the pediment or base of the ventilator, and the vanes are sufficiently hidden behind open ornamental panelling.

Howorth's Ventilator with ornamental casing.

Ventilators of this revolving description have been made without the Archimedean screw, but have not proved successful, as might be expected, being liable to long continuances of down draught.

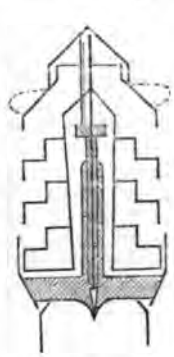
Messrs Ewart and Son, of London, have introduced into the interior of the Archimedean screw ventilator, and inside the vertical wind fan, a cone, by which an additional up-current is produced and a down-draught rendered impossible. They have also dispensed with the moving vanes or the roof portion of the ventilator, and have made the top part into a coned fixture, being led to do this by experiments they had carried on with their 'Prince' ventilator already described by me. They have endeavoured to remedy

several of the faults to which the Archimedean ventilators of some makers are liable, and one improvement consists in the arrangements to carry off the water. An ordinary Archimedean ventilator, when made to revolve by a gust of wind will be seen to continue revolving for a long time, but there existed a possibility of admitting a portion of the wind to blow downwards, which not only checked the up-current, but was felt unpleasantly by the people below. In the ventilator of Messrs. Ewart and Son, to which they have given the name of 'Empress', the up-current produced by the revolving screw is assisted by the induced current brought about by the passage of the wind over the cone. If, therefore, for lack of wind, the vanes should become stationary, the ventilator does not become necessarily useless, as the cone will, therefore, exert its own powerful action. As the vertical fans only revolve with the screw, and the top part is a fixture, the friction of the revolving parts is reduced, and the ventilator can be worked with the minimum of wind. There is no doubt that this is a certain improvement upon the older forms of Archimedean ventilators, as driving winds with downward direction, instead of being admitted, so as to check the up current, here strike against the cone in the interior, and the current is thrown upwards against the top plate, and out at the opposite side.



Ewart and Sons 'Empress' Archimedean Screw Ventilator with cone and fixed top. A, cone; B, screw; C, fixed cover.

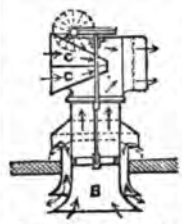
An earlier attempted improvement on the Archimedean screw ventilator introduced by Mr. Howorth, of Farnworth and Manchester, was sought to be introduced by Mr. E. Thomas, of London. His apparatus consisted of surmounting a vertical shaft, by a peculiar form of revolving screw, so constructed as to produce an up-current from the shaft, when acted upon externally by the force of the wind. This up-current was produced by a series of blades, of zinc or iron, fixed to each other in such a way as to form a double screw, having a series of separate air channels, up which foul air is drawn. The rain was prevented from entering the interior by the overlapping of the outer portion with the inner one, as the screw revolves. This ventilator was introduced by Mr. Thomas in 1878, and for practical purposes might be regarded as identical with that of Messrs. Ewart and Son, manufactured some months earlier. I have frequently used the latter design, named by him the 'Queen', as a ventilator, with tolerably good results; but it is now, for the most part, superseded, in the case of small shafts, by ventilators of a fixed order, such as the 'Prince' pattern.


Section.
Thomas's Improved Foul Air Extractor, with revolving screws.

Screw.

Elevation of the 'Queen' Revolving Foul Air Extractor of Ewart and Sons.

I have already described the ventilator upon the revolving induced current system, introduced by Mr. Bury, with its horizontal partition plates, and I will now describe his ventilator of this description, fitted with a vane wheel, capable of being rapidly revolved by the force of the wind; and thus, by means of a worm fixed upon the same spindle, and gearing with the stationary worm wheel, serving to turn the revolving head of the ventilator in the direction of the wind.



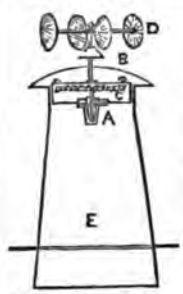
Bury's Revolving Induced Current Ventilator, fitted with vane wheel. A, outer tube; B, main shaft; C, hollow cone.

This modification of his 1876 ventilator is furthermore arranged with an outer tube, the lower extremity of which is formed with a bell mouth, and opens into the apartment requiring to be ventilated. The upper extremity of this outer tube is also open to the atmosphere, but can be covered with a movable hood. The shaft upon which this ventilator is fixed also finishes with a bell mouth. The action of this ventilator will be readily apparent.

Thus, if the revolving head be kept turned in the proper direction by the action of the wind, a current of air will continually pass through the hollow cone, then through the revolving head, and finally escape at the outlet. This horizontal current produces the vacuum in the vertical shaft, and consequently induces an upward through such a vertical shaft.

When a ventilator is provided with an outlet tube, as in the case of that under review, fresh air from without is made to descend this outer tube, and to enter the room in a horizontal direction, without the evils of down-draught being felt by those below. Mr. Bury, however, provides a sliding grid for the regulation of such fresh air, and by its means, also, the influx may be closed altogether.

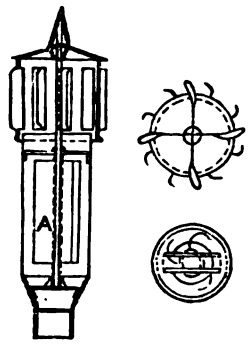
To increase the upward current in a ventilating flue, it is most customary to use the heat imparted by an adjoining chimney flue, or a lamp, or a gas jet can be fixed at the base of such flue, in order to impart the necessary outcast. According to Dr. Ancell Ball, a similar result to that produced by a lamp or gas burner may be obtained by the employment of a horizontal wheel, mounted on a pivot, turning in a glass footstep-bearing, fixed underneath the hood, and provided with concave vanes, or anemometer cups.



Dr. Ball's Revolving Ventilator. A, glass bearing; B, hood; C, horizontal wheel; D, vanes; E, shaft.

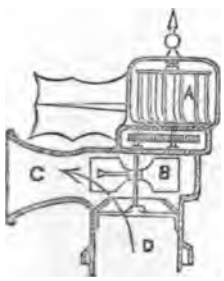
An improved system of creating an upward current in a ventilating shaft was introduced by Mr. Carter, of London, during the past year. In the ventilator a chamber is formed at the upper end,

and cross bearings are also fixed, to receive and guide a spindle, the lower end of which is supported by a glass bearing, to prevent friction, or the necessity for using oil. To this spindle are fixed straight blades, parallel to, but slightly inclined to the spindle, and curved on the faces, and almost touching the interior of the chamber at their outer edges. On the upper end of the spindle is fixed a revolving head, provided with openings, and with a number of projecting concave vanes; and when the wind blows, a rotary motion is imparted to the head and spindle, whereupon an upward current is induced in the interior of the ventilating shaft. At the same time, the interior of the chamber at the upper end of the cap, is kept pure by the evolutions of the internal blades. A door is fitted in the ventilator, to facilitate cleansing, etc.



Vertical section plan, looking on the roof, and sectional plan through rotary head of Carter's Revolving Ventilator. A, chamber with bearings to support spindle.

Mr. Buchan, of Glasgow, in conjunction with his fluid-tight, jointed Ventilating Cowl, makes use of automatically wind-acting fans, for assisting in the uptake and discharge of foul air from hollow shafts in connection with rooms. He devised, in 1878, several arrangements of horizontal fans, placed in a box in the plane of the discharging mouth, and with their spindles, each mounted in proper bearings, in the vertical centre line of the uptake neck of the cowl. Sometimes the ventilator is driven by an ordinary horizontal wind-wheel, with angled vanes all round its periphery, and mounted on the upper end of the fan-spindle, outside and above the cowl, so that the wind, from whatever direction it blows, always drives the fan.



Buchan's Automatically acting Fan Ventilator, with driving wind-wheel mounted on a separate spindle. A, driving wind-wheel; B, fan; C, cowl, with shaft D.

In another arrangement, the driving wind-wheel is mounted on a spindle of its own, which is geared to the spindle of the fan by the large wheel and pinion of their spindles respectively, so that, if desirable, the fan can be actuated at a greater speed, whenever this is found desirable.

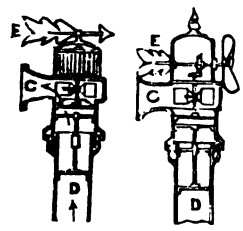
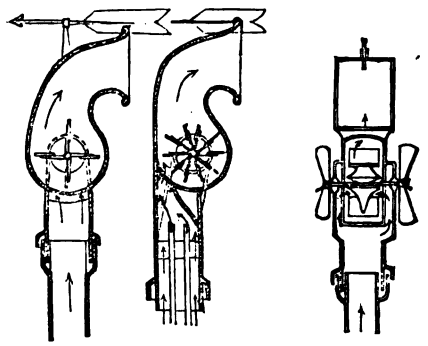


Fig. 1. Fig. 2.
Fig. 1, Buchan's ordinary Horizontal Wind-wheel Ventilator; fig. 2, Ventilator actuated by bevel wheels, etc.
D, ventilating shaft; C, cowl-mouth; E, wind-vane.

In a third arrangement, the fan is actuated in a corresponding manner by a bevelled pinion, the wheel being keyed on the shaft of a radial screw-vane-faced wind-wheel, which has its face always turned in the direction to the wind by the cowl and wind-vane, and in this way the wind is always acting on the face of the vanes, and turns the fan through the gearing at a higher rate of speed.

Of a similar general conception are an arrangement of vertical fans, mounted over the centre of the uptake throat of the cowl, and on the middle of its horizontal spindle, the latter working out through journal bearings in the outer case of the fan and cowl, and having mounted on each outer end a side or edge acting wind-wheel. A similar arrangement is used by Mr. Buchan, where heated or forced air, or gases, are used separate from those ascending the main shaft, and conducted up separate pipes. Although the whole of these ventilators have been described as being fitted on swivelling cowls, to be driven automatically by the wind, Mr. Buchan has arranged for their being driven by hand or foot, or by driving-cords, in connection with an engine. They can also be adapted so as to work by being wound up or connected with springs, by any kind of water, air, or gas-engine, by compressed air or electric motors.



Buchan's Vertical Fan Ventilators, with outside wind-wheels; also Ventilator with separate pipes in the main uptake shaft.

It is interesting to notice how many contrivances have been invented, in order to achieve a satisfactory uptake in a ventilating shaft. For instance, a loose pot, made of sheet metal, has been made to rest upon a circular helical band, fixed upon the pot, and operating by the action of the wind. The interior of the ventilator was also fitted up by Mr. Puttemans, of Paris, in 1876, with a rotating helix placed about half-way up, and actuated by the vitiated air in its passage upwards.

It would have been curious if inventors had not furnished us with an example of a cowl, hung loosely on its base, and in such a way as to swing according to the direction of the wind. Such an invention was introduced in 1876, by Mr. Deakin, of Southwark. In this case the cowl, which was fitted on the top of the shaft, was of a cylindrical form, slightly enlarged at the base, and hung on gimbals, by which means the cowl is free to incline in any direction. When

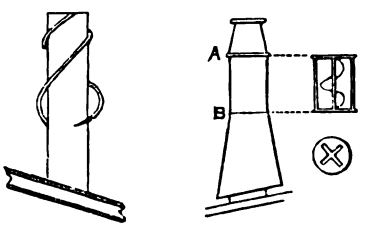
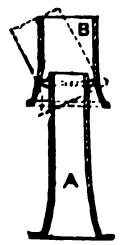


Fig. 1. Fig. 2.
Fig. 1, Putteman's Circular Helical Band, acted upon by the wind; fig. 2, Ventilator, with rotating helix C, placed between A and B.

not influenced by the wind it hangs vertically, but with the pressure of wind it presents its lower mouth, which is of somewhat larger diameter than the shaft below, to the wind, and in this way produces an upwardly-directed current through the cowl, with the usual uplifting benefits.



Deakin's Pivot-hung Cowl. A, shaft; B, cowl.

Sub-Earth Ventilation.—This unique method of tempering atmospheric air, of anhydrating and purifying it, was invented by Professor J. Wilkinson, of Baltimore, Ma., U.S., and was patented by him in the U.S. in 1874. It is now in use in fourteen States of the Union, and over a range of 12 degrees of latitude, and, where artistically arranged, it is alike useful and satisfactory, in both low and high latitudes.

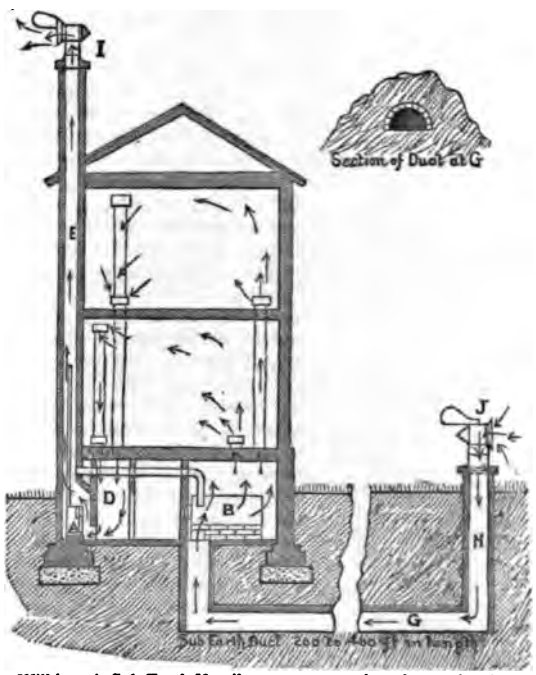
The result attained by the transmission of air through a subterranean duct, of proper dimensions and proportions, are new and marked, and almost marvellous. The most useful and economical effects are obtained when the air duct is laid in a stratum of earth which is found to be perpetually uniform in temperature. It has been found by experiment that a properly constructed duct will transmit and discharge a given volume of air into a building or apartment, perpetually and uniformly at the temperature of the stratum of earth in which the duct is placed, or at about 50° F., whether the air is admitted to the duct at 100° above zero, or at 26° below. The ducts used by the inventor are usually constructed with an earth bottom, and in fact, always, unless drainage is impracticable.

The other qualities imparted to air passed through these ducts are quite as valuable, and more remarkable than the heating and cooling of air. The bottom of the ducts—if the soil is other than clay—is artificially surfaced with it, and the well known antiseptic and deodorising effects of the clay thus utilised are very marked and invaluable in preparing air for human or bestial respiration. It is found, by testing with the hygrometer, that the humidity of air transmitted by a sub-earth duct, is so reduced that the moist bulb of the instrument often indicates four to five degrees lower than the dry one. Owing to the condensation of vapour on the surface of the duct, the air is moistened, particularly at the ingress end, and as it passes along, changing in temperature and density as it proceeds, it comes into contact with the bottom, sides, and soffit of the duct, and in so doing, all dust, motes, or pollen, which the air may contain, are arrested, and the air is still further purified. I have already shown how foreign particles can be arrested by water, when explaining the inlet contrivances of Mr. Weaver and others.

There is, however, another effect on air passed through the earth-duct that is equally remarkable, not less valuable, and has more deeply interested men of science than any other characteristic of sub-earth ventilation.

The loss from the premature acidification and coagulation of milk, set for separating the cream, for butter-making in ordinary milk-houses in the United States, has been estimated at over £1,600,000 sterling per annum.* This condition of milk, and this fearful loss, occurs when the atmosphere becomes close and heavy, and highly charged with electricity, and particularly at times when electrical discharges are frequent and violent. Buildings, however, the walls and ceilings of which are artistically insulated, and which are ventilated with air passed through a properly constructed subterranean air-duct, are found to be entirely proof against the influences above described, and the immense saving to the dairy interest is of course very highly appreciated. It is believed, by those most competent to judge, that a condition of the atmosphere that produces precipitate acidification, and augments fermentation, is adverse to health; and that any means of correcting such adverse conditions in air is invaluable in preparing it for respiration, especially by feeble invalids.

Such is a brief description of a system of ventila-



Wilkinson's Sub-Earth Ventilator. A, stove, in exhaust-chamber D, with smoke pipe up flue; B, steam-generator; D, exhaust-chamber; E, exhaust-shaft; G, sub-earth duct; H, ingress shaft; I, exhausting cowl; J, injecting cowl.

tion, which, wherever it is understood, is attracting much attention, and is daily growing more and more popular. It is believed, by the most practical Ventilating Engineers of America, to be an invaluable invention, and eminently suitable for hygienic purposes. There is also of late a great demand for this system in the Arts. Pure and cool air, supplied without stint, is so valuable in many industries during the heated season, that it is looked upon as a priceless boon in many studios and workshops, and is almost working a revolution in the method of supplying air to these places.

I will conclude my present notice of this invention by mentioning that it is in use in a dairy-shed in which 140 cows are kept continuously—as in London—and their only supply of air is through a subterranean duct, which delivers it to the stable, at all times, at about 50° Fahr. In January of the present year, the temperature of the external atmosphere, on the site of the shed, was on two occasions 26° below zero; yet the sub-earth air-duct supplied a volume

* This high figure is not wonderful. Returns which I tabulated in 1878 ('Dairy Engineering', xix, M.J.) proved that 1,245 cheese and butter factories existed in the United States of America, 17 were the Association of American Dairymen. In one state alone, that of New York, the number of cows reported was 388,600.

fficient for that number of animals, at 40° ro, by which it would appear, that by its ith the walls of the duct, the air was raised degrees. This result was attained at a of buildings at the same time, where the as in use; and Professor Wilkinson eximself to me as certain, that if the air-ducts as long as he is now in the habit of recomthem to be, the air would have been transd delivered into the buildings at the same ure as the stratum of the earth in which the are located, or at 50° above, instead of 40° o. Of course, when necessary, the air can red *ad libitum*, by artificial heat.

(*To be continued.*)

SANITARY INVENTIONS.

SPOROKTON.

OR R. V. TUSON has given the name of n—germ killer—to a new disinfectant and : which he has patented. It is supplied in ns by Messrs. Sutton and Phillips of Stow-Liquid Sporokton, No. 1, is a solution of chloinc, in diluted methylated spirit, saturated hurous acid gas. By using the spirit a liquid :d which contains 80 times its bulk of sulacid; whereas, if water alone be employed lvent, only about 30 volumes of the gas are . This form has been found to be capable eatest number of applications. Liquid No. 2 ne as No. 1, except that it contains chloride n place of chloride of zinc. No. 2 is used oying the bad smell in old beer barrels, itinkers' by brewers. No. 3, Solid Sporokton, ure of finely pulverised sulphite of lime and de of iron; kept in well-corked bottles, etc., no change; exposed to air it rapidly absorbs iich sets up a decomposition between the , the result being evolution of sulphurous and the production of chloride of calcium, e of iron. This powder furnishes an exeous method of generating sulphurous acid, iloride of lime furnishes an extemporaneous f generating chlorine.

TRUTT'S ABSORBENT WOOL.

; sanitary appliances which are in constant use n more daily request than cotton wool. The cotton wool, as prepared for purposes of nursing, for hospital use, on the field of d elsewhere, has been that it is not abso-e in fibre and that it is insufficiently absorbth these defects have been overcome by Strutt of Belper, who have succeeded in pro-n article which meets every possible requirereference to purity and great absorbent hile it possesses in other respects all the qualities of cotton wool which have made erial one which is in constant requisition. ew absorbent will probably, for sanitary and purposes, largely supersede that which has been in use.

TRACT OF CINCHONA RUBRI.

sposition to treat drunkenness as a disorder ay be in a measure ameliorated if not tonics and nourishing food, to which the researches of Dr. T. Lauder Brunton have given a considerable impetus, is daily becoming more general amongst the medical profession, when called on to cope with this distressing vice. The attention of the general public has been called to this plan of treatment by the asserted wonderful cures of drunkenness obtained by it by Dr. d'Unger, of Chicago, to which we called attention in the SANITARY RECORD, in the early part of this year. In order to facilitate the administration of this extract of Red Bark, Messrs. Evans, Lescher, and Evans, of London and Liverpool, make a preparation from true quilled red bark, of fine quality, which they assert to contain the whole of the alkaloids in chemical combination with their natural acids, as they exist in the bark. We fear that a specific for intemperance will never be discovered; but, as a tonic, to dispel the cravings of a disordered stomach, to form a substitute for the deleterious stimulants which have become a necessity to the drinker, and to strengthen the deranged nervous system, which is both the cause and the consequence of drunkenness, we believe that this extract of Cinchona Rubri is likely to be of the greatest utility. Its moderate prices, and facility of administration, render it especially valuable to the medical practitioner who, in those cases of unavowed drunkenness, but too common in the experience of the profession, can easily exhibit this preparation as a tonic, without awakening the susceptibilities of a patient who is not aware that the cause of his or her deranged health is but too manifest to the experienced observer to whom the symptoms are confided.

RICHARDSON'S PURE THYMOL SOAP.

Messrs. Richardson and Co., of Leicester, have combined the new and powerful disinfectant Thymol with refined saponaceous matter, so as to form a useful and agreeable toilet soap. Thymol, a crystal obtained from the wild Thyme, is now recognised as one of the most powerful of known disinfectants; and to this valuable property it adds the advantage of possessing a fresh and agreeable perfume, and of not possessing any poisonous properties whatsoever. To us the fresh natural odour of the Thymol is far more agreeable than the floral scents usually incorporated with toilet soaps. The body of the soap is soothing and emollient to the skin; and we can give an unqualified approval to Messrs. Richardson's Thymol Soap, for its refreshing and cleansing properties. Thymol is well spoken of as a detergent in some skin diseases. We have not, ourselves, had an opportunity of trying it for that class of diseases, but it is quite conceivable that its antiseptic properties may prove useful in arresting the spread of many troublesome skin affections. As a toilet soap, for daily use, we know of nothing more wholesome and more pleasant.

BIBLIOGRAPHY.

ALLEN, N.—The Prevention of Disease, Insanity, Crime, and Pauperism. Boston, Rand, Avery, and Co. 8vo. 25 p.

ARNOULD, J.—Société Française d'Hygiène. Sa raison d'être, son but, son avenir. Lille, imp. Lefebvre-Ducrocq. 8vo. 4 p.

ARNOULD, J.—L'Hygiène Ancienne et l'Hygiène Moderne. Paris, imp. Cusset et Ce. 8vo. 21 p.

GIORNALE della Società Italiana d'Igiene. Anno I, No. 1 and 2, Gennaio-Febraio and Marzo-Aprile. Si publica ogni due mesi. Milano, Via S. Andrea 18. gr. 8vo. p. 1—244 con 8 tav. 14 Lire p. anno

GIBERT, Dr.—Une Visite au Bureau d'Hygiène de Bruxelles. Le Havre, impr. Santallier. 16mo. 32 p.

GLEN, W. C. A.—Public Health Act, and the whole Law relating to Public Health, Local Government, etc. 9th ed. London, Butterworths. 8vo. 1,010 p. 36 sh.

KOHLER, Ant.—Die Gesundheitslehre in der Volks- und Fortbildungsschule. Leitfaden zur Ertheilung eines populären Gesundheitsunterrichts für die Hand des Lehrers und zum Selbstunterricht. Freiburg i, Br., Herder. 8vo. 54 S. 0.40 M.

LACASSAGNE, A., Professeur.—Précis d'Hygiène Privée et Sociale. 3e édition, refondue et augmentée. Paris, Masson. 18vo. 570 p. 7 Frcs.

LEGISLATION AFFECTING THE PUBLIC HEALTH, Memorandum of the American Public Health Association on —. Washington. 8vo. 2 p.

LEVY, M.—Traité d'Hygiène Publique et Privée. 6e édition. Paris, Baillière. 2 vols. 20 Frcs.

MANSION, P.—La Question de l'Enseignement Elémentaire des Sciences Naturelles, de l'Hygiène et de l'Agriculture dans les Ecoles Primaires, les Ecoles d'Adultes et les Ecoles Normales. Louvain, Lefever. 8vo. 16 p.

MEDDELELSER, Hygieiniske, udgivne af E. Hornemann og Gaedeken. Ny række. 2det bind's 2det hefte. Kjobenhavn, Lund. 8vo. 74 sid. 1 kr. 50 öre.

RECUEIL des Travaux du Comité Consultatif d'Hygiène Publique de France et des actes Officiels de l'administration sanitaire. T. V. avec une carte. Paris, Baillière. 8vo. VIII—520 p. 8 Frcs.

RICHARDSON, Benjamin Ward.—A Ministry of Health and other Addresses. London, Chatto and Windus. 8vo. 354 p. 10sh. 6d.

RICHARDSON, Benjamin Ward—The Future of Sanitary Science: an address delivered before the Sanitary Institute of Great Britain, at the Royal Institution, July 5, 1877. London, Macmillan. 12mo. 48 p. 1 sh.

ROSSI, Frederico Gerolamo, Dr.—Conferenze d'Igiene per gli Ufficiali. Torino. 16mo. 388 p. 3.50 L.

SOUBEIRIN, Dr. J. Léon.—Hygiène Elémentaire. 3e édition. Paris, Hachette. 18mo. 159 p. 1.50 Frcs.

TRANSACTIONS of the Massachusetts Medico-Legal Society. Vol. I, Number 1. Cambridge, Printed at the Riverside Press. 8vo. 54 p.

VERSLAG aan den Koning van der Bevindingen en Handelingen van hat Geneeskundig Staatstoozigt in het Jaar 1877. s'Gravenhage, Van Weelden en Mingelen. 4to. 458 p.

VERSLAG van de vereeniging tot bevordering der volksgezondheid, opgericht te Dordrecht in mei 1867, 1875 en 1876. Dordrecht, H. R. van Elk. 8vo. 4 en 68 bl. met uitslaande staat. 1 fl.

WIEL, J., Dr. u. Prof. Dr. GNEHM.—Handbuch der Hygiene. 5. u. 6. Lieferung. Karlsbad, Feller. gr. 8vo. S. 273—384. à 1.60 M.

BEHM, G.—Statistik der Mortalitäts-, Invaliditäts- und Morbiditätsverhältnisse bei dem Beamtenpersonal der Deutschen Eisenbahnverwaltungen. Nachtrag pro 1877. Im Auftrage des Vereins deutscher Eisenbahnverwaltungen bearbeitet. Berlin, Puttkammer und Mühlbrecht. gr. 8vo. 47 S. 1.60 M.

BESNIER, Ernest, Dr.—Rapports sur les Maladies Régnantes, faits à la Société Médicale des Hôpitaux de Paris. T. ii, 3e fascicule. 13 Année, 1878. Paris, Malteste. 8vo., pp. 213, 315. 2 frcs.

DE BEURMANN, L.— Recherches sur la Mortalité des femmes en couches dans les Hôpitaux. Paris, Balliere. 8vo., 64 p.

BIDRAG till Sveriges Officiela Statistik. Helso-och-sjukvarden. Ny föl'd 16. Sundhets-collegio under-daniga berättelse för ar 1876. Stockholm, Nørstedt och söner. 4to. IV—79 S. med XLVIII tabeller.

BÖCKH, Richard, Director Die Bevölkerungs-, Gewerbe- und Wohnungsaufnahme vom 1 December 1875 in der Stadt Berlin. Im Auftrage der Städtischen Deputation für Statistik Bearbeitet. Zweites Heft. Berlin, Simion. 4to. VIII—72 u. 84 S. mit 2 Tafeln. 6 M.

BÖCKH, Richard, Director Statistisches Jahrbuch der Stadt Berlin. Fünfter Jahrgang. Berlin, Simion. 8vo. 240 S.

COMUNE DI ROMA.—Direzione di Statistica e Stato Civile. Relazione sul movimento dello stato civile nel trienno 1875-1877 con alcune altre notizie statische. Roma, tip. Pallotta. gr. 8vo., 123 p.

BERICHT der Münchener Commission über die Besichtigung der Canalisations und Berieselungs-Anlagen in Frankfurt a. M., Berlin, Danzig und Breslau sowie der Liernur-Anlagen in Amsterdam, Leiden und Dordrecht. Beilage VII zum III. Bericht über die Verhandlungen und Arbeiten der vom Stadt-magistrate München niedergesetzten Commission für Wasserversorgung, Canalisation und Abfuhr. München, Druck von E. Mühlthaler. 4to. IV—122 S. mit 13 Beilagen. 15 M.

BROMHEAD, Horatio K.—The Exit Channel Method of rapidly Removing, Deodorising, and Clarifying Sewage as applicable to Glasgow. Glasgow, Bell and Bain.

DURAND-CLAVE, Alfred.—Etat de la Question des Eaux d'Egout en France et à l'Etranger. Nancy, imp. Berger-Levrault et Ce. 8vo. 8 p.

DURAND-CLAVE, Alfred.—Situation de la Question des Eaux d'Egout et de leur Emploi Agricole en France et à l'Etranger. Paris, Berger-Levrault. 8vo. 15 p.

DUVERDY, Ch.—Dangers et Inefficacité des Irrigations par les Eaux d'Egout. Paris, Dunod.

HOCHEREAU.— Du Choix de l'Eau Potable. Bruxelles, imp. H. Manceaux. 8vo. 26 p.

NICHOLS, W. Ripley, Prof.—Chemical Examinations of Sewer Air. From the Report of the Superintendent of Sewers, Boston, 1879. Boston, Rockwell and Churchill. gr. 8vo. 16 S.

TERRIER, Ch.—Etude sur les Egouts de Londres, de Bruxelles, et de Paris. Paris, Delahaye et Ce. 8vo. 35 p.

BOUGON, G. Dr.—Des Avantages et des Inconvénients au point de vue de l'Hygiene, de l'Arrosage des villes pendant l'été. Montdidier, impr. Radenez. 8vo. 35 p.

NATIONAL WATER SUPPLY.—Notes on Previous Inquiries prepared in Connexion with the Congress of the Society for the Encouragement of Arts, Manufactures, Commerce, held 21 and 22 May, 1878. London, Bell and Sons. Gr. 8vo. 108 and XXVIII p. 8 d.

SER, Louis.—Essai d'une Théorie des Ventilateurs à force Centrifuge, Détermination de leurs Formes et de leurs Dimensions. Paris, Masson. 8vo. 44 p.

TEALE, T. Pridgin. — Dangers to Health: a Practical Guide to Domestic Sanitary Defects. London, Churchill. 8vo. 10 sh.

WAZON, M. A., Ingén.—Chauffage et Ventilation des Edifices Publics et Privés; Chauffage des Serres; Précédé d'Etudes Pratiques sur les Combustibles. Paris, Lacroix. 8vo. 332 p. avec 7 pl. et 51 fig. 10 Frcs.

DE BAGNAUX, J.—Conférence faite à la Sorbonne aux Instituteurs des Départements, Délégués à l'Exposition Universelle de 1878, sur le Mobilier de Classe, le Matérial d'Enseignement et les Musées Scolaires. Paris, Delagrave. 12mo. 88 p. avec fig.

BELVAL, Th.—L'hygiène Scolaire au Congrès International d'Hygiène de Paris, Août 1878. Extrait d'un Rapport Présenté à M. le Ministre de l'Instruction Publique. Bruxelles, H. Manceaux. 8vo. 30 p.

BERICHT über die Untersuchung der Heizungs- und Ventilationsanlagen in den städtischen Schulgebäuden in Bezug auf ihre Sanitären Einflüsse, erstattet im Auftrage des Magistrats zu Berlin. Berlin, Beelitz in Comm. gr. 8vo.—IV. 79 S. 1.50 M.

DOR, H., Dr.—Etude sur l'Hygiène Oculaire au Lycée de Lyon. Basel, H. Georg. 8vo. 2·50 M.

DROUINEAU, G.—Notice sur l'Importance de l'Hygiène Scolaire. La Rochelle, Siret. 8vo. 15 p.

COHN, Hermann, Dr., Prof. — Die Schulhygiene auf der Pariser Weltausstellung 1878. Breslau, Morgenstern. gr. 8vo. 48 S. mit 2 lith. Tafeln. 1·50 M.

FRESENIUS, Carl, Dr.—Ueber Schulsanatorien im Allgemeinen und die Errichtung eines solchen in St. Blasien im Schwarzwald im Besonderen. Vortrag. Frankfurt a. M., Druck der Deutschen Reichpost. 8vo. 33 S.

JANSSENS, E.—Hygiène des Ecoles. Bruxelles, imp. E. Guyot. 8vo. 45 p. 1·25 Frcs.

LINCOLN, D. F. — Sanitation of Public Schools in Massachusetts. Boston, Band, Avery and Co. 8vo. 24 p.

NARJOUX, Félix.—Les Ecoles Publiques. Construction et Installation en Belgique et en Hollande. Paris, Morel. 8vo. VII—259 p. avec 117 figures.

NARJOUX, Félix.—Les Ecoles Publiques, Construction et Installation en Suisse. Paris, Morel. 8vo. VII—217 p. avec 117 fig.

RIANT, A.—Conférence sur l'Hygiène de l'Ecole, faite à la Sorbonne le 29 Août, 1878. Paris, Delagrave. 12mo. 65 p.

SANITARY PATENTS.

ABSTRACT OF SPECIFICATIONS.

3879. Ventilating apparatus. W. Scott.

A square louvre case is placed on the roof, and has four ventilating shafts, one in each corner, in communication with the interior of the building, and enclosed with vertical curved vanes, in which two lateral openings communicate with the interior of the case. In front of each opening is another vertical curved baffle plate which guides the wind in certain fixed directions through the case, entering from either of the four sides, and issuing at the opposite side.

4037. Apparatus for Ventilating Buildings, etc., W. Fisher.

This relates to that system of ventilating buildings wherein a 'sunlight' or other similar group of burners placed near the ceiling is employed for heating air in a cylinder or pipe fixed within a vertical ventilating shaft to create an upward current for withdrawing the vitiated air from the room. It consists principally in closing the top of the inner or hot-air tube, and in perforating the sides all round above the ceiling, so that the hot air and direct products of combustion of the gas are compelled to pass out at once into the outer or ventilating shaft, and mingle with the vitiated air ascending from the room, whereby the current of the same is considerably accelerated, and the ventilation of the room is improved.

4402. Food for Infants, E. J. Spitta.

Fourteen pounds of best wheaten flour, half an ounce of ground ginger, and one ounce best refined sugar are thoroughly mixed and baked in a tin, or enamelled iron or copper vessel, for five hours in a water bath, after which the food is ready for use.

4429. Heating and Ventilating Churches, etc., C. J. Henderson.

This consists of a chamber through which air may be passed, either in a very small or large quantity at pleasure, in which also the air may, by a suitable heating apparatus, be very highly heated, and from which the air is passed into the church at a few feet above the floor.

4442. Apparatus for Saving Life from Drowning, F. J. Money.

This consists of an air-proof and waterproof bag, having in it a hole closed by a valve opening inwards and kept shut by a spring. In this bag is placed a mixture of some solid acid and some supercarbonated alkali. When a person wearing the bag falls in the water the liquid enters by the valve opening, and carbonic acid gas is evolved, which is prevented from escaping by the valve.

2137. Purification of Water, etc., C. Bischof, Hart Street, Bloomsbury, London.

2192. Dry Earth Closets, R. Weare, Manchester.

ORIGINAL PAPERS.

THE POLLUTION OF AIR WITH COAL SMOKE.

By C. Estcourt, F.C.S.,
Analyst to the City of Manchester, etc., etc.

In dealing with this subject, I do but intend touching as it were the fringe of a much greater question, that of the necessity of pure air. All sanitarians, however, will admit readily enough that pure air is of sufficient importance to warrant a long article upon one great cause of its pollution, namely, coal smoke. The general public, although they recognise to a certain extent the benefit of pure air, cannot conceive, as can medical men and lay sanitarians, of what exceeding great importance it is. When, however, one remembers that all other requisites of existence, such as pure food, pure water, etc., are only used at distinct and sometimes long intervals, and that we are always, either waking or sleeping, consuming air, the importance of this vital requisite in a pure condition may be seen by all.

Air in large towns has been daily and yearly growing more and more impure, even without the aid of works which give off specially noxious vapours, and with which, in this paper, it is not proposed to deal. Yet our forefathers appear to have been even more widely awake than ourselves to the necessity of keeping within bounds the special form of pollution which is the subject of this article. In Manchester, in the year 1801, it is stated that fines were inflicted, in one day, upon eleven millowners, to the enormous extent of £100 each, for permitting the escape of black smoke. Now we are content with a fine of 10s., although there is a tremendous increase, not only in the amount of life and property which require protection, but also in the offending blacks and vapours.

Since then, at varying intervals, various schemes have been proposed to obtain the desired object. Very few of these are of practical application in towns existing under present conditions. Mr. Peter Spence has proposed the erection of a monster chimney, with draught sufficient to draw off, down special flues, all the smoke produced, both in houses and works; but it is evident this plan would necessitate such great structural changes, as to make it impossible and impracticable to apply it in towns already built. In towns just growing up I do not doubt it would prove a great success, as it would cause the smoke to be diluted before it descended. I am not, in this paper, prepared to take the ground that any serious damage arises to health or vegetation from the coal burnt in our houses alone. I think, in proof of this, one has only to look at London, in that part of it—the West-end—remote from the East, with its works. We shall see that, although as large as, if not a larger quantity of coal is burnt there than in the East-end, still, its effect upon vegetation is not observable. In what English city do we find window gardens flourish to the same extent as in London? And where, in any English manufacturing city, do we, as a rule, find so pleasant and refreshing an atmosphere as among the mass of population, streets, and trees of the West-end?

As coal smoke from houses, then, does very little mischief, we must look to some other cause for the reason of the contrast between Manchester and London. In Manchester our factories and large works consume coal by the thousands of tons, and it is the state of concentration of the smoke vomited forth by large works, as compared with the small quantity given off from houses, that causes the difference in its effect.

As an example of the difference that is visible to the eye, between the smoke given off by the chimneys of 2,500 houses, and that from one single work, I would recommend such a town as Bangor. It is situated in a hollow between the hills, and when one looks from the hills at the smoke from the whole town, it scarcely appears greater than a blue haze. When, however, one small foundry which exists there is at work, the lower town appears almost enveloped in dark filthy smoke.

The result, then, of these immense volumes of smoke given off at once, containing both blacks and other deleterious compounds, may be seen in the dull, heavy atmosphere peculiar to Lancashire manufacturing towns, as compared with non-manufacturing towns north or south of England. The effect, both upon the buildings and the people, has been well described by writers in the Manchester newspapers. The writer, also, has had favourable opportunities of noting the difference between southern towns and our own manufacturing districts.

The only real work which has, up to very recently, been done in purifying coal smoke, has been done by inventors in improving the stoking of the boiler-fires of large works. The only idea, as a rule, these inventors had of smoke impurities, was that they consisted of blacks or soot. Now, in reality, this is the smallest trouble there is in dealing with the purification of smoke. Good automatic stokers have been invented and applied, which do reduce the amount of blacks to a very small quantity; but the evil these stokers are powerless to deal with, is the unseen, invisible enemy of all life and vegetation, which is given off steadily and unceasingly from every factory and works chimney.

The invisible constituent of coal smoke, which is so deadly in its effects when concentrated, is known as Sulphurous Acid gas, and is the product of the combustion of all ordinary coal, which contains sulphur in proportion varying from 1 to 2 per cent.

To give a more complete idea of the exact composition and effect of coal smoke, I will quote from such of the evidence given before the 'Noxious Vapours Commission', 1876, as bears upon this subject. An abstract of this is to be found in the report of the same Commission, 1878* (which last is obtainable for 5½d., and should be in the hands of every sanitarian).

Dr. Angus Smith, in answer to questions 212-220, says—I have given my attention to the comparative escape of sulphurous acid from coal, and from the strictly chemical processes I made a calculation that 166,000 tons of sulphur are burnt in alkali works; about 100,000 tons in manure works; and more than a million tons in coal. This includes the whole consumption of coal in manufactures, ironworks, steam-engines, and houses in the whole country, which is really 110,000,000 tons per annum. I take the amount of sulphur at 1 per cent, but I know, in many cases, it is much more. The whole of the sulphurous acid from the 1,100,000 tons of sulphur from the coals consumed in this country goes into the atmosphere; whereas, only a small percentage of the sulphur used in the chemical

* See Sanitary Record, vol. ix, p. 345.

works goes into the atmosphere. I do not see my way to the condensation of sulphurous acid from the coal used in private houses; but I think that probably in large works it may be done. I am afraid that I cannot distinguish the damage done by the true smoke (the carbonaceous particles), and the damage done by sulphuric acid, so that if all the smoke was rendered invisible by complete combustion, there would still remain all the sulphuric acid to do what damage it liked.

Dr. Angus Smith continued—questions 227 and 340. The air of London is not very acid, not equal to Manchester, but it is acid. For example: before my laboratory in Manchester no trees whatever will grow, and grass will scarcely grow; trees grow in London. It has often been said that the deposition of the finely divided solid matters upon vegetation is one of the greatest causes of the deleterious effect of coal smoke, quite apart from sulphur. But I have thought otherwise. I have always found the sulphur in proportion to the blackness.

A. E. Fletcher, Esq., Inspector under the Alkali Acts, says, 6743—I think there is still injury distinctly traceable to the hydrochloric acid evolved, even with a proper application of the terms of the present Act, but that is mixed up with so large and injurious an action, which comes from the burning of an immense mass of coal, that when the Acts are fully carried out, I quite believe that the injury from hydrochloric acid will cease to be the prominent one. Indeed, one may, I think, with truth say that it is not the prominent one now; *the coal smoke must be charged with fully half the injury.* 6859—A comparison has been drawn between coal smoke and other acid emissions, for coal smoke is an acid. Knowing the amount of coal that is burnt in the United Kingdom, and taking the amount of pyrites that is burnt for the production of oil of vitriol, it turns out that there are six and a half times as much sulphur or sulphur acid given off by the coal in the United Kingdom as by all the pyrites, even if none of the acid produced from pyrites were condensed. I only want to draw that parallel to show that we must not omit the idea of coal smoke.

Dr. B. W. Richardson, M.D., F.R.S., after describing, in answers 7483, 7486, *et seq.*, experiments upon the effects of smoke, etc., says—I would submit that in future legislation the sulphurous acid given off as a part of the smoke from combustion of coal in large furnaces should be treated as a noxious vapour, with a view to its suppression. The tenour of the evidence has been that no means have yet been discovered for preventing the sulphurous acid that is evolved from coal. I think there would be no difficulty whatever in condensing the sulphurous acid in the chimney (at Mr. Lockey's Salt Works, Northwich). I attribute the greater portion of the damage done from salt works to the action of sulphurous acid escaping by the chimney. I think salt works should be placed under inspection as consuming a large quantity of coal, and emitting a very large quantity of smoke in a rather limited area. I would suggest that all manufactories emitting coal smoke should be under inspection.* In answer to question 3030, says—My attention has been specially drawn to the injurious effects of the smoke which arises from the chimneys of alkali and other works, independently of the vapours that are borne along with it. It is not to be doubted that this aids as a factor the destruction of vegetation, for the smoke contains sulphurous acid. It has been computed for me that the coal used in Runcorn and Widnes contains two per cent. of sulphur, and that only one per cent. is given off, and there would be yielded 240 tons of sulphurous acid per week, or 12,000 tons in a year.

Mr. John Pattinson, Analyst for Newcastle, 7271, says—There is very little doubt that the highly destructive character of the smoke of the copperworks is due chiefly to the large proportion of sulphuric acid it contains. I am decidedly of the opinion that this operation should be placed under inspection. I am aware that no method of preventing the escape of this destructive gas from copper works has come into general use, and that there is some doubt as to whether the manufacture can be profitably carried on if the condensation of the deleterious fumes is insisted upon. I am inclined to think, however, that some method of washing the smoke, combined with some of the recent mechanical means of producing draught, such as a Root's blower, may be found to be practicable, as it would be certainly effectual in removing the more destructive sulphuric acid.

E. Carey, Esq., of the firm of Messrs. Gaskell, Deacon, and Co., Alkaline Manufacturers, Widnes, says, question 5290 *et seq.*—I have compared the amount of sulphurous acid which escapes in our vitriol manufacture with the amount of sulphurous acid which we unavoidably emit in the combustion of coal; and the utmost amount that we can lose of sulphurous acid in our manufacture is about one-sixth of that emitted by the combustion of coal. *Table of sulphurous acid produced in works of Widnes during eighteen months.* —Sulphur sent up chimney and otherwise lost from manufacture equals 395 tons, which as sulphurous acid gas equals 790 tons. Fuel used during same period, 143,170 tons, at 1¼ per cent. sulphur, equals 2,147 tons, which as sulphurous acid gas equals 4,294 tons. I think that in works (chemical) properly conducted I may ascribe the escape of sulphurous or sulphuric acid entirely to the consumption of coal, and the present enactments relating to smoke deal in no way with the escape of sulphurous or sulphuric acid. If the Legislature were to say that there should be the same sort of test for the sulphurous acid escaping from coal smoke as there is now from alkaline vapours, I should be willing to submit to any regulation on the subject, if it applied to all the other burners of fuel.

J. Brock, Esq. (Managing Director of British Alkali Works at Widnes), question 5438, gave table of sulphurous acid produced in works of witness during twelve months: Sulphur sent up chimney and otherwise lost in manufacturing process, equals 106 tons, which as sulphurous acid equals 212 tons. Sulphur in fuel during same period 50,000 tons at 1½ per cent., equals 750 tons, equals, as sulphurous acid, 1,500 tons.

Dr. D. B. Hewitt, of the firm of Messrs. Bealey and Co., Chemical Manufacturers, Radcliffe, says, 7089—I calculate that about 27 tons of sulphur pass into the air in a year from our vitriol chambers. On 27,000 tons of coal we burn off on an average 1.5 per cent of sulphur, equal to 405 tons, less 40.5 for 1 per cent. of sulphur in the 4,050 tons of cinders and refuse. Therefore, we send off in this way 364.5 tons of sulphur up three large chimneys. That is, we pollute the air thirteen and a half times more with the sulphur of the coal we consume than with sulphur escaping from the manufacture of sulphuric acid.

Jas. Mactear, Esq., of the firm of Messrs. Tennant

* See SANITARY RECORD, vol. x, p. .

and Co., Glasgow, says, 6414—We burn at St. Rollox 127,000 tons of coal, giving 1 per cent. of sulphur, equal to 1,270 tons of sulphur given off in the form of sulphuric acid. In Glasgow, assuming 1½ tons of coal annually to each person, we should get 10,000 tons of sulphur; and assuming the coal used by manufacturers as ten times that used for domestic purposes, we get 100,000 tons of sulphur.

E. K. Muspratt, Esq., in Appendix to Report of Noxious Vapours Commission, gives the following details respecting the quantities of sulphuric and sulphurous acids present in the coal smoke emitted at his works :—

	Grains per cubic foot of smoke.		
	SO_2	SO_3	Total in Sulphur.
In chimney using 10 tons coal weekly, Average of six days gave equal 0.5354 grains sulphurous acid per cubic foot of smoke	0.2210	0.3930	0.2677
In chimney using 40 tons coal weekly, Average of five days gave equal 0.5326 grains sulphurous per cubic foot of smoke	0.2796	0.3163	0.2663
In chimney using 60 tons coal weekly, Average of four days gave equal 0.4868 grains sulphurous per cubic foot of smoke	0.1885	0.3731	0.2434

The average of these three experiments would equal 0.647 grains of sulphuric anhydride per cubic foot of coal smoke.

Dr. Angus Smith, in *Air and Rain*, page 282, gives, in a summary of the result of rain analyses, the quantity of sulphuric acid. From this the following details are copied :—

	Sulphuric acid. Grains per gal. of rain.
Valentia	0.1911
London, 1869	1.4345
Manchester, 1869	2.9163
Glasgow	4.9139
England, country places	0.3865
Scotland, do.	0.1444

From this it will be seen that the actual population of a town has much less to do with the quantity of acid than the presence of large works. On page 444, Dr. Angus Smith gives an example of the effect of the free acid from smoke in Manchester upon (among other compounds) mortar, a sample of which was found to contain 48 per cent. of sulphate of lime. No wonder the buildings so rapidly decay.

Dr. A. Ransome says, in his paper on Foul Air and Lung Disease, read before the Manchester and Salford Sanitary Association :—'Nature cannot stifle the stokers of furnace fires when they carelessly allow volumes of dense black smoke to escape either from factory chimneys, or from equally great offenders, the flues of our great warehouses. She cannot turn the stream of evil vapours and gases back into the works from which they pour. Legislation and vigilant inspection can alone interfere with this, and it is for you and for the people of Manchester so to influence the governing bodies, that they shall protect you from the pollution of vital air.'

The foregoing opinions of men eminent as scientific men, as well as chemical manufacturers, will show more plainly than any argument can do the evils arising simply from coal smoke. My own analyses are in fair accord with these results, but as they were, with regard to the amount of blacks actually given off, conducted with a smoke-washing apparatus upon a larger scale than any made previously, I will quote the results, together with those obtained by J. Lowthian Bell, Esq., M.P. Mr. Bell says, in answer to question 11,157—I have been at the trouble to ascertain experimentally the quantity of carbon given out from a furnace making black smoke, and at the very outside I have never been able to make out, to my own satisfaction, that five per cent. of the entire carbon contained in the coal could by any possibility escape as black smoke.

The results of five of my experiments where water only was used in the apparatus, may be given, and it is important to note that there appears to be a considerable physical difference in the blacks or carbon given off during coal combustion. Thus, one portion of the carbon floats upon the surface of the water in the tank, whilst another portion sinks to the bottom. An estimate has been obtained by weighing the floating part and the sedimentary part of the carbon.

	Coal used.	Pounds of Carbon found in tank after working.			Percentage of carbon in coal smk.
	Cwts.	Skimming.	Sediment.	Total.	
Experiment 1	40	5.8	7.5	13.3	0.29
,, 2	33½	8.5	10.9	19.5	0.52
,, 3	32	13.0	16.8	29.8	0.83
,, 4	33	11.0	14.2	25.2	0.68
,, 5	33	5.4	6.9	12.3	0.33

The whole of the sedimentary matter in these experiments was calculated from the weight of it in the well-mixed contents of tank after working. It will thus be seen that the average percentage of blacks or unconsumed carbon given off in the combustion of coal in the ordinary manner is always less than 1 per cent., a great proportion of this, as shown by the ash, being unconsumed particles of coal mechanically carried forward.

From the preceding facts it is apparent that ordinary automatic stoking appliances do not effect a very extensive saving (only of the blacks), and that an apparatus which could eliminate both the blacks and the acid gas of the smoke would be preferable to any automatic stoker alone. Such an appliance, I am happy to say, has been invented. In the year 1872, Mr. W. J. Johnson, manager at the extensive lead works of Messrs. Beaumont, of Allendale, invented an apparatus for the purpose of absorbing and arresting the lead fumes. The machine so invented was found perfectly satisfactory, and has saved a large amount of money to the proprietors at Allendale. Mr. Johnson thought it might be applied to arrest the blacks from coal smoke, and accordingly a machine was erected at the wire works of Messrs. Johnson and Hobbs, Manchester, but it was found, after a few months' working, that the whole of the ironwork was so eaten away that it was impossible, apparently, to carry out the idea. Some years afterwards (1877) I was inspecting these works, and my attention was drawn to the machine. When told of the difficulty, I informed them there was a remedy. At their request I commenced a series of experiments, the result of which was that a large machine, used for two boilers consuming 50 tons of coal per week, was erected at Messrs. Goodfellow's Engineering Works, Hyde.

At these works I have continued my experiments

* The skimming in this experiment was weighed altogether, and the other skimmings were calculated from this. The skimmings did not vary much.

from August 1878 up to the present date, having had during the whole of them the valuable assistance of Mr. F. F. Goodfellow, whose knowledge, both of chemistry and mechanics, has always been freely placed at my disposal. The results of these experiments prove beyond all doubt that it is possible to free coal smoke emitted by works, etc., from both blacks and acid gas vapours, at a cost within fair and reasonable bounds, especially when one considers the great outlay which some smoke producers are now put to. It is not at all an uncommon occurrence to hear manufacturers who are summoned for smoke nuisance say they have just spent a hundred to five hundred pounds in trying to keep down the nuisance.

The resulting compounds may be reasonably expected not only to reduce the cost to a minimum, but may possibly be actually turned to profit where, as in gas works, etc., the amount of sulphurous acid, which at present escapes, exists in very large quantities.

The following is a description of this machine or smoke condenser, which is now actually working at Hyde, in connection with the furnaces of two boilers consuming about 50 tons of coal per week :—The Smoke and Fume Washer consists of an enlargement of the flue, through which the fumes pass on their way to the chimney, or outlet; it is usually made of strong timber, so put together as to be quite air-tight. The bottom of this flue is formed by a water-tank, in which the water and milk of lime are placed. This tank is constructed of timber, and is divided into compartments, the number of which varies according to the amount of coal to be consumed. In each compartment is a dash wheel, or a wheel of convenient diameter, made after the style of a paddle-wheel, but upon each blade of the wheel is fixed a number of spikes, or prongs, which, as the wheels revolve, dip into the water in such a way as to cause a continual spray, or fine rain, through which the fumes have to pass, and are thereby washed. To ensure that none of the particles escape, after each wheel there is a screen composed of coke, laths, or other suitable material, through which the vapour must pass. At the chimney end of the machine is fixed a fan, which keeps the draught at any required speed. Not the least recommendation of this apparatus is that only a very short chimney is necessary.

I will now give results of the working of this apparatus when water was used to absorb the gases from the smoke; when soda ash solution was used; and when milk of lime was used. An aspirator similar to those used in testing under the Alkali Acts was placed upon both inlet and outlet of smoke washing apparatus.

TABLE I.

Results obtained with Water only.

Number of Experiment.	Hours during which the machine was worked and smoke aspirated.	Coal used.	Smoke Cleansing Apparatus. Inlet. Cubic feet of smoke aspirated.	Inlet. Cubic centimetres of Normal Soda neutralised by smoke acid.	Inlet. Grains of Sulphuric Anhydride (SO_3) per cubic foot of smoke.	Outlet. Cubic feet of smoke aspirated.	Outlet. Cubic centimetres of Normal Soda neutralised by smoke acid.	Outlet. Grains of Sulphuric Anhydride (SO_3) per cubic foot of smoke.	Percentage of Acid absorbed.	Contents of the tank of the machine.
		Cwts.								
1 ...	5	27	6.52	7.8	0.740	11.27	5.8	0.316	—	Watr. only
2 ...	6½	32	10.14	12.0	0.731	13.54	4.0	0.181	—	do.
3 ...	6½	32	11.18	18.2	1.002	13.31	7.6	0.351	—	do.

TABLE II.

Results obtained when Soda-ash was Dissolved in Water in Apparatus.

1 ...	6½	32	11.43	14.4	0.777	14.45	none	none	—	—	Alkaline
2 ...	6½	32	8.57	12.2	0.877	8.20	none	none	—	—	do.

TABLE III.

Results, showing quantity of sulphur arrested by water and soda-ash respectively.

Number of Experiment.	Hours during which the machine was worked and smoke aspirated.	Coal used. Cwts.	Tank of the Apparatus holds 1,120 gallons. Grains per gallon of Sulphuric Anhydride (SO_3).	And is equal to Total lbs. of SO_3.	Total lbs. of Sulphur.	Material used in tank.
1 ...	11.0	40	499.5	79.9	31.9	Water
2 ...	6.20	33½	485.7	77.7	31.0	do.
3 ...	6½	32	519.6	83.0	33.2	do.
4 ...	6½	33	481.8	77.0	30.8	do.
4 ...	6½	33	406.1	64.9	25.9	do.
5 ...	8	32½	734.3	117.4	46.9	Soda-ash

The following are a few examples of the results obtained on examination of the liquids from the aspirators, lime having been used in the machine:—

TABLE IV.

Number of Experiment.	Hours during which the machine was worked and smoke aspirated.	Machine. Inlet. Cubic feet of smoke aspirated.	Inlet. C. c. of Normal Soda neutralised by smoke acid.	Inlet. Grains SO_3 per cubic foot in smoke.	Outlet. Cubic feet of smoke aspirated.	Outlet. C. c. of Normal Soda neutralised by smoke acid.	Outlet. Grains SO_3 per cubic foot in smoke.	Coal used averaged per hour. Cwts.	Contents of tank of machine.
1 ...	9½	4.03	3.2	0.472	16.47	0.00	0	5	Kept alkaline with milk of lime.
2 ...	7¼	9.94	11.4	0.708	15.88	0.00	0	do.	do.
3 ...	6	10.97	11.4	0.641	11.91	0.00	0	do.	do.
4 ...		26.53	25.8	0.605	12.94	5.8	0.270	do.	Kept slightly acid, milk of lime added at commencement.

It will be seen that when lime is used in sufficient quantity to keep the liquid in the machine alkaline, not a trace of acid escapes up the chimney. The aspirators could not be kept exactly at the same rate, owing to the occasional deposit of blacks in the inlet tube; but as the results are calculated upon the actual cubic feet passed, this is not material.

The following are analyses of the liquid from the apparatus when milk of lime has been used. This liquid may be used over and over again with fresh lime:—

TABLE V.

Date of Experiments.	Grains per Gallon. Hydrated Sulphate of Calcium.	Calcium Sulphite.
1879, May 28 - - -	237.60	28.21
,, 29 - - -	223.00	1.72
,, 30 - - -	167.45	65.45

The last sample was received on same day as the two first, and had consequently undergone less change by oxidation.

The following are fair examples of the sediment deposited in the apparatus when milk of lime is used. The quantity of dry sediment obtained slightly exceeds in practice the weight of the lime used :—

TABLE VI.

Sediment from Tank.	Condition of the Contents of the Tank during Experiments.	In 100 parts.					
		Calculated as Sulphur.		Quantities found.			
		From Calcium Sulphate.	From Calcium Sulphite.	Calcium Hydrated Sulphate.	Calcium Sulphite.	Calcium Carbonate mixed with a little Hydrate.	Blacks or Insoluble Carbonaceous matter.
Dried upon the top of Apparatus	Alkaline	8.38	5.48	45.02	20.56	29.72	3.5
Do. do. but then kept two months exposed to air, and not re-dried	Alkaline	7.54	4.61	40.57	17.75	28.35	
Dried quickly in laboratory*	Acid.	14.66	3.48	78.76	13.00	6.00	
Fresh wet sediment containing 62 per cent. water	Alkaline	2.69	4 58	14.51	17.18	4.00	
A well-known disinfecting powder to compare with sediment from the smoke condenser*		4.59	5.30	23.60	19.88	51.35	

It will thus be seen (Table 1) that with water alone in the apparatus, the highest amount of acid gases absorbed equals 75 per cent., whilst the machine was completely corroded.

With soda ash (see Table 2), the whole of the acids and blacks were arrested, so that the smoke was completely purified, and no corrosion of the working parts of the machine took place. The soda ash is, however, costly, and the product being chiefly sulphate of soda (only 5 to 12 per cent. of sulphite being formed), this was practically valueless. The experiment was only undertaken to ascertain whether an alkaline solution in this apparatus would really absorb all the acid vapours.

The next experiment was with milk of lime (see Tables 4, 5, and 6), mixed with the water in the tank, and then the results were quite equal to expectation. The whole of the acid vapours were absorbed, and a solid product, containing so much calcium sulphite as to form a valuable disinfecting compound, was left as a deposit in the tank. This compound, which also contains the blacks, is raked out in the form of mud, and contains about 60 per cent. of water. This water may be driven off by the heat of the top part of the machine, upon which the mud after it has been allowed to drain, is placed; or may be readily filtered in a Needham and Kite press. The sample of disinfecting powder marked A, the real value of which is known to depend upon the sulphite of lime it contains, contains a small per centage of carbolic acid, and sells at £12 per ton. As will be seen, it does not contain more of the active element, sulphurous acid, than the dried sediment from the smoke washing machine.

* In this experiment insufficient lime was purposely used, and the result shows that a slight excess of lime gives best results in calcium sulphite.

Local Authorities may find a large scope for the application of this compound. Where a dry closet system of removal is in use, the pails may be well lined with it, instead of being, as at present, sparingly sprinkled with some disinfectant. It would certainly enable the contents to be kept undecomposed for a much longer time than at present, for now the pails in summer smell horribly after two or three days' use.

In the dried condition, it might be supplied to houses which are provided with water closets, and would no doubt be extremely useful in preventing the development of the well known water closet smell, which, as all know, is not so much owing to sewer gases, as to actual smell from the deposit round the pans.

Before I conclude, I must again draw attention to the importance of this question of pure air. The Manchester and Salford Sanitary Association (a body which includes all the medical men and others in or near Manchester who have a special interest in sanitary matters), gave their support to the following statement, which formed part of a memorial presented, in 1877, to the Corporations of Manchester and Salford:—'There is much medical testimony that certain diseases, especially of the respiratory passages, are directly caused and aggravated by residence in the impure air of large towns, and also that the general tone of health being unduly lowered, there is a corresponding disablement for resisting disease in any form.'

ON THE VALUE OF CHEMICAL AND MICROSCOPIC ANALYSIS,

IN DETERMINING THE INFLUENCE OF DRINKING-WATER IN ORIGINATING OR PROPAGATING SPECIFIC DISEASE.*

BY J. LANE NOTTER, B.A., M.S., M.D.,

Surgeon-Major, Army Medical Department; Assistant-Professor of Military Hygiene in the Army Medical School, Netley.

IN the short time allotted to each paper, it is impossible to enter into all the details involved in the consideration of the subject under discussion. My desire is to bring before this section of the British Medical Association a few points connected with the chemical and microscopic analysis of drinking water, and especially having reference to the influence it has in originating or propagating specific disease.

Chemical analysis has of late years been the subject of much criticism, and this more especially where water has been submitted to the test of analysis. It has partly resulted from the difficulty we have in stating whether a particular water supply will produce a definite disease, and not so much where it is a question of the wholesomeness of the supply, in the ordinary acceptation of that term, which is required. The truth is, that the poison of enteric fever, in common with other specific forms of disease, has never yet been isolated, and until such is demonstrated, I claim for water analysts the same consideration as is shown in similar cases.

Whatever the ultimate poison may be, or in whatever form it may exist, whether resident in solid particles, in solution, or in the gaseous state, the quantity sufficient to produce specific disease in man is so minute and so subtly distributed as to place

* Read before the Section of Public Medicine, British Medical Association, Annual meeting, 1879.

their isolation, so far as we at present know, beyond the scope of chemical analysis.

In investigating the life and habits of marine plants and animals, we cannot fail to perceive in what an extreme state of dilution the nutrition of these various forms exist. In many instances there is not a trace of animal or vegetable life for them to feed on, and they must depend on substances held in solution in the water for their nutrition.

How, for example, can the genus Globigerina, and other numerous Foraminifera, live in the abyss of the ocean, where no solar light can penetrate to favour the development of vegetation, otherwise than by the process we have stated.

The fact seems to be this, that the surface of the body acts as a dialyser. This is, no doubt, the function of the gelatinous envelope in the Thalassicollidæ, or the simple pellicle of the amœbæ and other Rhizopoda. It is true, indeed, that the amœbæ get the credit of eating solid food, but this is extremely doubtful, because they will, by involuntary action, place themselves as readily round a piece of indigestible quartz as a Navicula or any other Diatom. It is exceedingly probable that, in the case of the Rhizopoda in general, the extensile plasma of their passive organisms is drawn out into pseudopodiæ, by the exercise of the nutritive forces in particular directions, with the semblance of active and even voluntary motion. The nutritive processes appear to develope dialytic currents in the surrounding fluid, which on this account are quite invisible, while they operate as a moving cause on movable bodies, deceiving the observer. The rigidity of the frustule of the Diatom, while it admits of the movement of the whole organism, precludes the extension of the pseudopodial processes, after the manner in which we witness it in the vegetable amœboids, in the roots of mosses and in Volvox Globator.

The morbific agencies in disease are other than the products of organic decomposition; they are so minute, and their essence is so infinitesimal, and yet so potent, that ordinary disinfectants, which mask their odour, leave their virulency undiminished. In water, chemical analysis cannot specify them; it can only tell us of certain conditions to which it is collateral. We can, by means of chemical analysis, estimate the nitrogenous compounds in water, and where these exist we must take heed lest the specific germ, or its soluble or gaseous product, be present.

Chemistry cannot isolate these morbific agents; and water, even chemically pure, may still carry the germs of specific disease. If, as has lately been suggested, that the *materies morbi* of some of these diseases have a habitat amid the common putrefactive changes of dead organic matter, it is hardly possible for them alone to contaminate water without also introducing an element with which their development is inseparably bound up, and which would be amenable to the test of chemical analysis.

The active movements of bacteria are diminished or arrested temporarily by the admixture of pure and fresh albumen; but after a while, when chemical laws begin to assert their sway, the activity of these organisms, which may be regarded as the index of their nutritive forces, will be resumed.

Again, we must remember that whether in the aerial, in the aquatic, or in the marine regions, under every condition throughout this globe, the law of life, for plant and animal, is the same. The presence of a plant or animal in drinking water is no more an evidence of impurity than is the existence of an oak or an elephant on land. The higher forms, as for instance the Crustaceæ, are on the contrary a favourable sign in water, and I can, from my own experience, state that living Cyclops is seldom or never to be found in bad water, though the exuviæ may, and often is present.

I must not, however, allow myself to be misunderstood; for all who have studied this subject will admit that the form of animal life which we find in water has a very significant value. Some forms are clearly associated with bad water, while others appear to be present only in a pure supply.

If, on the other hand, the balance of life in the aquatic world is broken down, the water is contaminated, after-changes take place, and fungi live on the disintegration of the higher forms. The development of fungi, indeed, would appear to hold a close relationship to simple decay, or that slow process of oxidation which is comparatively odourless, while the Schizomycetes are associated with more active decomposition, which would appear to owe its offensiveness to the development of new compounds, arising *pari passu* with the activity of the nutritive forces, and concomitant movement of the organisms.

The best argument in support of this position is the fact that the putrefactive odour is actually produced by bacterium termo, in a medium destitute of organic matter, as for example, a solution of tartrate of ammonia.

I have selected, from a very large number, the following analyses of samples of drinking-water, taken from places where the propagation of enteric fever was traced to an impure water supply.

ANALYSIS OF A SAMPLE OF DRINKING-WATER.

From.....* * * *	Drawn.....Not stated
Source ....Tank and Reservoir	Received....Nov. 30th, 1876
	Examined ..Dec. 3rd, 1876

Physical Characters.

Colour (*through 18 ins.*) .....Slightly yellow	Lustre .....Good
	Taste .....Disagreeable
Turbidity .....Hazy	Smell .....None
Sediment ..... Large	

Chemical Analysis.

Qualitative (*water unconcentrated*)—

Lime.....Present	Ammonia .....Present
Magnesia .....Trace	Nitric acid .....Large
Chlorine .....Present	Nitrous acid .....None
Sulphuric acid .....Trace	Oxidisable matter.....Present
Phosphoric acid.....Large	Iron or Lead .....None

Hardness—

Fixed.....	3°15	Degrees of Clark's Scale.
Temporary or Removable ..	6°65	
Total	9°80	

Quantitative—

	Grains per gallon.	Parts per million (1,000,000)
Volatile matter (by incineration and after re-carbonating)....	1·1200	
Oxygen required for oxidisable organic matter	2·7400	
*a*Ammonia free	0·2000	
*a*Ammonia albuminoid	0·9760	
*a*Nitric acid (NO_3)	6·1586	
*a*Nitrous acid (NO_2)	None	
Total Nitrogen included in Nitrates and Nitrites.....	1·3906	

a N.B.—These constituents, with the oxidisable organic matter, indicated by the oxygen required, are included in the *Volatile Matter.*

Chlorine.....	0·8432
Sodium (combined with chlorine)	0·5474
Calcium carbonate	4·4300
Fixed Hard Salts	3·1500
Sulphuric acid (SO_4)	8·8794
Alkaline carbonates	
Sodium or other metal (or SO_4) not included in Fixed Hard Salts	
Silica, Alumina, Iron, etc.	
Total Solids (by evaporation).....	18·9700

The microscopic examination of the sediment showed fine Oscillatorian filaments, articulated and

colourless, a very bad sign. These colourless filaments are, I believe, a frequent cause of impurity in water; and the passage from these into the recognised bacteria is almost insensible. They are surrounded by a gelatinous matrix. Can this be derived from these minute forms? and if so, is it not a question whether, as a colloid substance, it is soluble, and in a state of extreme dilution is capable of absorption, and so gives rise to pythogenic conditions?

In this sample there is an absence of chlorophyll; all the Diatomaceæ were divested of their endochrome, and this, I think, may be regarded as an evidence of the absence of oxygen in the water.

The presence of Coleps and Coccudina, Vorticella microstoma, Trinema, Oxytricha Gibba, Kerona, Stylonychia, Enchelys, Epithelium, Mycelium, and Spores of Fungi, Cotton and linen fibre, and dyed wool, must be regarded as unfavourable.

No. 2. This is also an analysis of a sample of water from a district in which several cases of enteric fever occurred.

ANALYSIS OF A SAMPLE OF DRINKING-WATER.

From		Drawn	Not stated
Source	Rain-water Tank	Received	Dec. 7th, 1879
		Examined	Dec. 10th, 1879

PHYSICAL CHARACTERS.

Colour (*through 18 ins.*)	Yellow	Lustre	Fair
Turbidity	Slight	Taste	Flat
Sediment	Large	Smell	None

CHEMICAL ANALYSIS.

QUALITATIVE (*water unconcentrated*)—

Lime	Present	Ammonia	Present
Magnesia	None	Nitric acid	Very large
Chlorine	Present	Nitrous acid	Trace
Sulphuric acid	None	Oxidisable matter ..	Present
Phosphoric acid	Large	Iron or Lead	None

HARDNESS—

Fixed	6°30	Degrees of Clark's Scale.
Temporary or Removable ..	0°70	
Total	7°00	

QUANTITATIVE—

	Parts per million (1,000,000)	*Grains per gallon.*
Volatile matter (by incineration and after re-carbonating)		2·5500
Oxygen required for oxidisable organic matter	0·7400	
a Ammonia free	0·3904	
a Ammonia albuminoid	0·2800	
a Nitric acid (NO_3)	27·4382	
a Nitrous acid (NO_2)	0·2300	
Total Nitrogen included in Nitrates and Nitrites	6·2657	
Chlorine		2·5296
Sodium (combined with chlorine)		1·6423
Calcium carbonate		0·4700
Fixed Hard Salts		6·3000
Sulphuric acid (SO_4)		
Alkaline carbonates		
Sodium or other Metal (or SO_4) not included in Fixed Hard Salts		11·0081
Silica, Alumina, Iron, etc.		
Total Solids (by evaporation)		24·5000

a N.B.—These constituents, with the oxidisable organic matter, indicated by the oxygen required, are included in the *Volatile Matter*.

The chemical analysis show the albuminoid ammonia to be largely in excess, as also the free ammonia and volatile matter. The nitric acid is exceedingly large, while the oxygen required for organic matter is within limits. The microscopic examination shows evidence of a very bad kind. Again we find these fine Oscillatorian filaments, some devoid of colour, and twisted, bacteria in the immediate vicinity, Fungoid spores and Oxytricha Gibba, Glaucoma Scintillans, Halteria, Euplotes, Acineria, forms always associated with bad water, mineral grit and spores of fungi, worn pine fibre, dyed wool and cotton, and amorphous matter.

When the dissolved organic matter in water is large, when on analysis the organic oxygen and chlorine are in excess, when the free and albuminoid ammonia indicate no slight contamination, careful microscopic examination should always follow. Close observation and investigation will disclose, by the aid of the microscope, fermentation fungi in the sediment, as well, often as bacteria, such as spirilla, monads, amœbæ, and some of the ciliated infusoria, as Glaucoma Scintillans, Gastrochæta, Paramecium Aurelia, Oxytricha Gibba, Coleps Hertus, Euplotes, Enchelys, and the solitary Vorticella.

These forms not only indicate that dissolved organic matter exists in the water, but as a rule are only to be found in stagnant water. In many cases where ciliated infusoria are present with a good supply of wholesome food, they will be observed to exhibit a corresponding plumpness, and the contained food will be seen through the transparent walls of the body. On the other hand, when the pabulum has undergone those ordinary changes which unfit it for assimilation, the animalcules will present a starved and empty condition, with a much increased transparency of tissues. Bacterium termo may be regarded as the normal state of the bacterium, the surrounding gelatinous matter being simply the representative of that which forms the indefinite frond in the genus Microhaloa and other Palmellaceæ. It is very remarkable that in ferruginous waters we find almost a total absence of animal or vegetable life, and, indeed, we seldom meet with ferruginous waters which contain organic matter to any appreciable amount.

I have lately analysed thirty such samples, and all gave very nearly the same results. There is an absence of microscopic forms in this class of waters. I have never seen bacteria in a highly ferruginous water, but I have in nearly every sample recognised Leptothrix Ochrœa, which is rather an ill-defined mycelioid structure, and in one or two samples only Didomohelix. May not this point indirectly to the advantages of spongy iron as a filtering medium?

In investigating this subject, we must bear in mind that when dealing with complex bodies, and especially with organic matter held in a state of extreme dilution, chemical analysis is limited in its powers, and may, indeed, mislead us, so that we may consider as one and the same substance or compound two things vastly different. To explain. It is within the knowledge of every chemist that the composition of starch and dextrine is precisely the same, namely, $C_6H_{10}O_5$. They are isomeric bodies, so that a difference in their properties must be ascribed to a difference in the arrangement of their component particles. Given dextrine and starch, and reduce them to their primary elements, chemical analysis will not differentiate between the two, but by the aid of the microscope we are at once enabled to say which the substance presented to us is.

The same may be said of all the different forms of starch, which differ very considerably *inter se*, and may be readily detected or singled out under the microscope, while the most careful chemical analysis can only develop one result, namely, the composition in the abstract. So in relation to diseased germs as commonly understood, though they may be specifically distinct, and each give rise to a special train of symptoms, their separate elimination would seem equally to baffle our powers of chemical elimination, by which, up to the present, we have only been able to arrive at some common resultant, such as albuminoid ammonia, or some other product, probably

of a secondary combination. Our only chance of gaining information will be by an accurate and scientific knowledge of microscopic appearances, as well as by chemical analysis. The latter will point out the main characters of the water; it is only by means of the former that we will be able to differentiate between a harmless Desmid and an Infusorian of evil omen.

Again, when decomposing organic matters (animal) are exposed in liquid to the air, and are at the same time protected from light, some of the nitrogen existing in them in the form of ammonia undergoes oxidation, and is converted into nitric and nitrous acid, which, combining with the alkaline matters present, give rise to nitrates and nitrites. Messrs. Schloesing and Muntz and Robert Warrington have pointed out that the process is a fermentative one, due to the presence of a nitrifying organic ferment present in the liquid. Does this ferment exist in every water and under every condition in which contagia are present? Surely not; and by its absence have we not some clue to the extreme severity of some attacks of fever distributed by water-supply, and to the apparently mild ones present at other times.

From the foregoing remarks I think we may deduce the following conclusions:—

1. Chemical analysis of water, though it fails to isolate or detect specific germs, or to differentiate between the forms of organic matter, is valuable, as it gives us a knowledge of the conditions under which special organisms thrive and grow, and often points out indirectly what may be the source of such poison.

2. Microscopic analysis is of extreme importance, as it assists us to demonstrate the various kinds of organic matter which are present, and reveals to us the conditions which are most favourable to the growth of the lower forms of animal life which we know are inimical to a pure water supply.

THE HEALTH OF LEICESTER IN 1878.

By Alex. Mc Cook Weir, M.D.

Dr. Johnston, in his Annual Report on the Health of Leicester in 1878, states that the mortality in the borough of Leicester in 1860 was 20.36. According to the late Dr. Moore, whose valuable reports are before me, the corrected mortality of that year was 22.49 per 1000 of the population. Again, on page 6, the mortality under a year is recorded as 971: the corresponding figure in Dr. Crane's report is 981. This is a more serious discrepancy, as it vitiates all the calculations and mars the deductions to a considerable extent. I have made particular inquiries into this point, and am assured that the last-named figure is correct. The statement that the Sanitary Committee have succeeded in reducing somewhat the infant mortality by their 'strenuous efforts' seems to be founded on the above erroneous calculation, as it would give a ratio of 38.8 per cent. under a year to the total mortality against 39.2 with the correct calculation. Even this calculation, 38.8, is 3.2 above 1877; although this may be considered a small increase when viewed in the light of an additional 120 deaths from diarrhœa, and the natural increase of population. Scarlet fever is credited with 9 deaths by Dr. Crane, and with 12 by Dr. Johnston; fever with 30 and 31 respectively; and diarrhœa, which is more important, with 307 and 302, Dr. Johnston erring against himself in this particular.

Coming now to the two leading diseases dealt with in Dr. Johnston's report, to wit, typhoid fever and diarrhœa, we learn, on page 23, that 'no infant or child under two years died from typhoid fever', whereas 284 out of a total of 307, died from diarrhœa under the age indicated. This is a truly remarkable fact when read in the light of the following statement, that 'many of the cases of diarrhœa were but modified forms of typhoid fever'. Dr. Johnston's 'further experience of each disease' in 1878, enabled him to confirm the foregoing opinion, which appeared in his report on 1877. Yet, apart from the total immunity of children under two years of age, the mortality from typhoid fever in 1878 was as 12.0 to 122.8 per 1000 of the total mortality when compared with diarrhœa.

An attempt is made to show, on the same page, that there was a corresponding relationship with regard to time between the two diseases. It is a fact, however, that the mortality from typhoid fever in the 'fourth' quarter of the year was but two below the aggregate typhoid mortality of the third; and that the typhoid deaths for October were six, against three in July, and 2 in August, which were the months, of all others, when diarrhœa was excessively prevalent, the mortality therefrom for the two months being 111 and 121 respectively.

The supposed relationship existing between typhoid fever and diarrhœa breaks down under every trial. Even the characteristic symptom of the one is frequently wanting in the other: viz., the flux from the bowels. That Dr. Johnston could reproduce this theory of relationship for three years in succession, in which the typhoid mortality, beginning with 1876, was 41, 17, and 30 respectively, against a corresponding diarrhœa mortality of 263, 185, and 307, requires an amount of credibility beyond my powers. And that he should tell us of the absolute immunity of childhood from typhoid fever in one sentence, and its intense susceptibility to atmospheric impurities in the next, is opposed alike to reason and to common sense.

On pp. 25-28, there is an elaborate defence of the general health of the community and of the sanitary requirements of the town, including water-supply, closet accommodation, yard space, etc. In chapter II, page 29, we learn that diarrhœa was more prevalent among adults than children during the summer of 1878. It did not occur to Dr. Johnston that diarrhœa was not more common last summer among adults than were coughs and bronchial affections in the winter.

I prescribed for six weeks at the Friendly Societies' Dispensary in High Cross Street, beginning on the 27th January last, and shall not soon forget the number of bronchial complaints that presented themselves for treatment. During the three weeks ending the 8th March, there were 3,856 prescriptions for adults alone made up at the dispensary, and of this number 1,901, or over 49 per cent. of the total number, were for bronchial affections. Now, considering that there were but 1,928 adult cases of diarrhœa in the 12 weeks (less by 3 days) referred to by Dr. Johnston, it is very evident that adult summer diarrhœa in Leicester in 1878 was comparatively low when compared with the almost universal prevalence of winter bronchial affections. Why Dr. Johnston should give such prominence to diarrhœa more than bronchitis is incomprehensible to my mind. Again, measured by the proportion of adults to children in the town, Dr. Johnston's figures are misleading. Instead of an apparently higher

proportion of diarrhœa among adults compared with children, the proportion is about 2 per cent. of the former to 8 of the latter. And that adults should suffer to such an extent from diarrhœa, which in Dr. Johnston's opinion is the chief symptom of typhoid fever, and yet only 30 fall victims to the latter disease, is highly inconsistent. Dr. Johnston is of opinion that diarrhœa, as it occurs in Leicester, is 'contagious', and, like typhoid fever, is due to the presence of 'specific' germs. There is no record that he examined microscopically the stools of those suffering from typhoid fever, but he quotes Mr. Simon in support of the inhalation of noxious gases as paramount in the causation of diarrhœa. This is the first indication that the doctor has given of the origin of his theory. It is incredible that Dr. Johnston should have omitted to examine the typhoid dejecta, if both diseases are alike in their causation. It proves nothing to say that bacteria produce fermentation and putrefaction in organic liquids. That is a truism that rigidly applies to dead organic matter such as is found in sewers or cesspools, but decomposition is not the rule with regard to a living healthy organism such as man's; and when it does occur, indicates a diseased condition. The comparative absence of zymotic diseases from Leicester in 1878, indicated what Dr. Johnston has taken pages to prove; namely, a high state of health of the population generally, which is contrary to the existence, to such a fearful extent, of infantile summer diarrhœa on the ground of its zymoticity.

This brings me to grapple directly with the causation of local excessive infantile mortality from all causes. Dr. Johnston discards 'artificial feeding'. Well, it may be a subordinate factor, and, in my opinion, is, when viewed in the light of the birth-rate and habits of the people—habits which, as far as Leicester is concerned, entail almost as much neglect when the mothers are at home as when employed all day out of doors. Shoe and hosiery drudgery is the rule at home, and the soothing bottle is as needful to the mother under these conditions as to the proxy nurse. Moreover, Dr. Johnston is well aware that infantile mortality must, to a great extent, other things being equal, depend on the number of infants. On this point he is silent. He compares us with such towns as Bristol, Bradford, Oldham, and Hull, not telling us that the birth-rate in these towns in 1878 was 35.3, 35.8, 38.2, and 42.1 respectively, against 39.4 in Leicester and 39.2 in Leeds. It is somewhat remarkable that Hull, which had the highest birth-rate but one of the large towns, viz., Salford, should have had the highest infantile diarrhœa mortality in 1878; and that Leeds and Leicester, with a birth-rate nearly alike, should have a diarrhœa mortality of 6.9 and 8.7 respectively. Had the birth-rate, the habits of the people, and the temperature been in every respect equal, I have no doubt that the infantile diarrhœa mortality in both towns would have been exactly the same. The comparative immunity of London, Brighton, Bristol, and Portsmouth from infantile summer diarrhœa is not to be wondered at, in the presence of a birth-rate of 36.2, 29.6, 35.3, and 33.0 per 1000 in those towns in 1878.

The birth-rate of Leicester for the first quarter of 1879 was 40.2 per 1000, and is one of the six highest in the Registrar-General's list; the other five being Salford, Birmingham, Wolverhampton, Sunderland, and Liverpool. Oldham, Bradford, Bristol, and Portsmouth had for the same quarter a birth-rate of 35.6 35.7, 38.0, and 32.4. The birth-rate of Leicester is thus seen to be 4.8 per 1000 above the average birth-rate of the last-named towns. We may, therefore, look out for a smart attack of infantile summer diarrhœa, if the season be otherwise favourable. The birth-rate of the last quarter has not been exceptionally high, as the average birth-rate of Leicester during the last ten years was 40.9 per 1000 of the population. During 1878 the birth-rate of Leicester exceeded by 2.6 the average birth-rate of London and the twenty-two large towns on the Registrar-General's list; and was 2.4 above the average of the same list in the first quarter of 1879. It is clear, therefore, that the factor of birth-rate cannot be discounted in an impartial inquiry of this kind, and that it plays an important part in the local causation of an exceptionally high infantile mortality from all causes.

Dr. Larocque reports that the birth-rate amongst the French Canadians, English-speaking Romanists, and the Protestant section of the population at Montreal in 1878, was 59.25, 37.71, and 31.01; the corresponding death-rates being 38.96, 24.70 and 17.97 per 1,000 respectively. Accompanying these statistics, is the important statement that there is a fearful mortality amongst French Canadian infants in their first year. Thus, in a mixed population living under the same climatic and sanitary conditions, there is seen to be a wide difference in the rate of infant mortality, and we can only account for this marked difference by a study of the social conditions of the respective populations, foremost amongst which must be reckoned the birth-rate, parental health and employment, and the age at marriage. It will be found that the minor conditions of an excessive infant mortality are involved in one or all of these leading factors. Moreover, keeping these facts in view will guard us against giving undue prominence to diarrhœa or any other subordinate cause of an excessive infant mortality.

In Dr. Johnston's report, Oldham receives a double share of attention, and a double error is presented to us in consequence instead of one. 'The weather conditions in Oldham were very similar to those of Leicester' in 1878, says Dr. Johnston, on page 34. On the accompanying chart, however, the average maximum summer temperature of Leicester is marked 67°.1, against 64°.8 at Oldham. Apart from the fallacy of the above statement, does Dr. Johnston attribute no beneficial effects to Oldham from the marked difference of 2°.3 in its summer temperature? This and the lower birth-rate, and the persistent efforts of Dr. Sutton, the Medical Officer of Health, to raise the standard of infantile health, are, in my opinion, sufficient to account for the comparative absence of infantile diarrhœa from Oldham in the summer of 1878.

In the SANITARY RECORD of the 28th March last, I pointed out the importance of ascertaining the birth-rate and the habits and employment of the people in any given town or district before pronouncing a definite opinion on the causation of infantile summer diarrhœa, as the sanitary history of Leicester since 1849 was decidedly against the assumption that diarrhœa is due to a 'specific' cause, those years in which the birth-rate and temperature were alike low showing a marked diminution in the disease.

In correspondence with Dr. Farr, my attention was called to the fact that, although diarrhœa is classified as a zymotic disease, it 'may be induced by the want of, or the bad quality of, food'; and on this ground alone Dr. Farr justified its insertion among the zymotic diseases. Of course we all

know that 'the want of, or bad quality of, food' would induce a state of system favourable to the action of 'specific' germs, such as, according to Prof. Lister, occur in all atmospheres. The degree, therefore, of germinal infection would depend on the vitality of the children affected, and not on the number of infective organisms in the atmosphere.

Mr. Watson Cheyne's recent experiments have proved to demonstration that *micrococci* are 'harmless' under all circumstances; while *bacteria* only exert their putrefactive effects in the presence of 'malnutrition and lowered vitality' (*Lancet*, 17th May 1879). Mr. Lister, M. Pasteur, Dr. Burdon-Sanderson, and other distinguished scientists had previously recognised the same physiological conditions as necessary for the growth and development of 'germs'. What, then, does the presence of 'germs' in the vomit and stools of patients suffering from diarrhœa prove? It proves (1) that those suffering from that complaint are in a low physiological state either from temporary or chronic causes, and (2) that the 'germs' are a consequence and not a cause of this condition. Nearly a year ago, I wrote that 'a condition favourable to the life and action of germs is abnormal, and implies a preliminary preparation for their growth and development'. The importance of the foregoing observations by the most distinguished scientists of the day with respect to infantile summer diarrhœa will immediately appear.

Dr. Johnston asserts that atrophy and debility are consequences and not causes of infantile summer diarrhœa. A plate is given to render this intelligible. On page 48 we are told that the deaths from atrophy in the third quarters of 1876-77-78, exceeded the other quarters of the same years. With regard to this point, he makes the unwarranted insinuation that local medical men assign to 'atrophy' what should really be registered as 'diarrhœa'. Thus, babies dying in large numbers of symptoms among which diarrhœa is conspicuous by its absence are henceforth to be registered in accordance with Dr. Johnston's theory! I, for one, will resent such dictation. Aside from the question of registration, Dr. Johnston's assumption that diarrhœa is accountable for the high mortality from infantile 'atrophic' diseases is not supported by the facts. For example, in 1860, when there were but 56 deaths from diarrhœa, the mortality from 'atrophy and debility' increased from 112 in 1859 to 135 in 1860; and the same thing held good of 1862 and 1866.

Again, the gross local mortality for the half year ending the 1st July 1879, was 1,401, of which 679 were under 5 years of age; that is to say, 419 under a year, 156 between one and two, and 104 between two and five years. The deaths from atrophy and debility, premature birth and diarrhœa, during the half-year, were 121, 39, and 14 respectively. Thus, the combined testimony of the years 1860, 1862, 1866, and the first half of 1879, sets aside the assumption that a high death-rate from 'atrophy and debility' is due to diarrhœa. On the contrary, it proves that diarrhœa is subordinate in the causation of excessive local infant mortality; the percentages of the mortality under a year to the total mortality being 31.7, 30.9, and 35.9 for the three years 1860, 1862, and 1866, and 29.9 to the middle of 1879; that is, before the incidence of the usual diarrhœa epidemic. Clearly, therefore, for diarrhœa to be excessively fatal, there requires to be (1) a large population of susceptible subjects, and (2) a high maximum summer temperature; the relative importance of these determining influences being in the order mentioned.

I may just remark, with respect to the mortality maps at the end of the report, that they only corroborate what has been observed in other towns, namely, that the artisan and labouring classes, as might be expected, suffer more from infantile mortality, including mortality from diarrhœa, than those in a higher social scale.

While agreeing most cordially with Dr. Johnston in his recommendation of *crèches* as the best, if not the only, means for counteracting infantile mortality, apart from infringing on the liberty of the subject, I feel bound, in justice to science and common sense, to refute some of his allegations. Nothing but plain and honest dealing will induce the authorities to take steps for the abatement of the saddest of all mortality, infantile mortality.

It is but fair to state that since the publication of Dr. Johnston's report, the Chairman of the local sanitary authority publicly recognised in the *Midland Free Press* of 28th June, of which he is editor, that the 'normal death-rate of children', in Leicester, 'under five years of age is high, and for weeks together nearly reaches 50 per cent. of the whole mortality'. We have already seen that the 'normal death-rate' under one and five years to the 1st July was 29.9 and 48.4 per cent. of the total mortality; and the corresponding ratios for the three weeks ending the 26th July were 38.1 and 51.9, the deaths from atrophy and debility, premature birth, and diarrhœa being 17, 12, and 4 respectively.

While writing, Mr. Turner's report on the health of Portsmouth, in 1878, has appeared. He seems to think that I underrate the value of temperature in the causation of infantile summer diarrhœa, and he alludes to my paper in the SANITARY RECORD of the 28th March last, in proof of this assertion.

Now, I think a careful perusal of that paper, which was not hastily written, will convey to an impartial mind a totally different impression. In no part of the paper is the factor of temperature, or, indeed, any other probable factor, within the limits of my knowledge, overlooked or evaded.

What I wrote with respect to temperature was this:—'I find that the years with the greatest uniformity of the birth-rate, particularly with respect to the March and June quarters, have been those in which the highest continuous diarrhœa mortality prevailed, if the maximum summer temperature averaged about 69° F.' That statement was the outcome of a comparison of a number of years, and it has been locally illustrated on several occasions. The years 1868 and 1878 had, for example, an average maximum summer temperature of 75°.5 and 67°.1, and a corresponding mean minimum of 49°.6 and 52°.1. Now, it will be seen that the mean minimum summer temperature of 1868, fell short of Mr. Turner's standard minimum temperature of 50°; and yet this was the year, of all others, with the highest local diarrhœa mortality! Again: the mean minimum summer temperature of the two years, 1876 and 1877, was 51°.2 and 50°.1; but, notwithstanding the increased minimum temperature, both these years had a diminished diarrhœa mortality; notably 1877, whose average maximum summer temperature was but 64°.7, against 69°.2 in 1876. This evidence is clearly in favour of a high maximum temperature. But when we consider the close approximation between the birth-rate of 1868 and 1878, viz., 39.8 and 39.1; and the still closer approximation of the mortality from diarrhœa, under one year of age, viz., 10.7 and 10.2, and the marked disparity of temperature,

the conclusion is irresistible, that (1) the birth-rate which, like other years, was in excess during the first two quarters, and (2) the general health of the infants, had more to do with the causation of epidemic infantile diarrhœa than had heat *per se* on the one hand, or sanitary condition on the other.

Destructive as are the effects of heat on the infant population, the local statistics of the past thirty years show that excess of temperature, having exhausted the susceptible population under a year, attacks the next most susceptible above that age; and, finally, if intense and prolonged, as in 1868, expends itself on the aged and most susceptible adults. Hence the enormous disproportion in the mortality at different ages.

Mr. Turner gives a 'theoretical' diagram, and builds up a very elaborate mathematical argument, with a view to establish the assumption that a mean minimum temperature of 50°, if sustained for three weeks, will produce diarrhœa, and that the mortality therefrom will culminate in the third week. This assumption is at variance with the facts alluded to, and is fallacious in that it takes no account of the relative susceptibility and resisting power of the attacked, which must affect the incidence, duration, and termination of the disease.

The climax of local infantile diarrhœa mortality has been invariably attained within ten days of the highest degree of temperature, showing that the attack in Leicester is almost simultaneous therewith. This was the case with my own child, whose attack came on within thirty-six hours after the excessive temperature (86°) of the 21st July 1878.

Given, therefore, a uniform birth-rate, an equal degree of infantile susceptibility, whether congenital or acquired, or both, and an equal degree of heat, and I venture to submit that there would be an equal degree of prevalence of infantile summer diarrhœa throughout the country.

It is true that Mr. Turner combines with his postulate, 'artificial feeding, without which', he says, 'heat is impotent'. But why select 'artificial feeding', which he represents elsewhere in his report as a subordinate mathematical factor?

Dr. Brochard, of Paris, states, on the authority of a German *savant*, that infantile mortality has increased alarmingly in England, 'since a certain Godfrey has given to the public a cordial containing *a grain and a-half* of opium to the ounce of liquid'. Some years ago, Mr. Simon undertook, at the instance of the Privy Council, an inquiry into the causation of infant mortality. It was elicited that a Nottingham town-councillor, engaged in the drug trade, sold 'about 400 gallons of laudanum annually, at least one-half of which he believed to be administered to infants'. Another Nottingham town-councillor stated, that 'in the shop where he served his apprenticeship, 13 cwt. of treacle per annum were manufactured into Godfrey's Cordial'! The mayor of Coventry furnished a return of the amount of Godfrey sold by twelve retail druggists in that city, from which 'it seemed probable that at least ten gallons of this medicine were sold per week in Coventry, which, as a teaspoonful is the usual dose given to an infant six months old, would amount to at least 12,000 doses'!

Dr. Moore, the late esteemed medical officer of health for Leicester, had 'been informed, in 1866, by one of our own druggists, that he sells by retail, upon an average, one gallon of laudanum per week, the greater part of which is administered to infants'. [It is to be regretted that Dr. B. W. Richardson did not see his way to use stronger language with regard to this nefarious practice than occurs in his article in the July number of the *Contemporary Review*. 'I fear,' says that gentleman, 'that amongst the infant children of the poor, the use of narcotics containing opium is a much abused system.'] When to the foregoing is added my own personal experience in Leicester, it will be seen that I have some reason for asking Mr. Turner why he selects 'artificial feeding', unless on the ground that it is a generic for all the physiological transgressions of inexperienced and premature maternity.*

In conclusion, I demur to Mr. Turner's 'theoretical' line of argument, and his illogical deductions. Much as I regret having to say this to a gentleman who has rendered me courteous assistance early in this inquiry, and who is probably my senior, I especially demur to his meeting recorded facts by a *theory*, which he says is only 'sufficiently near the truth to demonstrate the controlling effects of temperature'; a conclusion which, whatever may be thought of the premises, I, for one, subject to the foregoing reservations, never disputed.

I cannot conclude this paper without expressing my deep obligations to Dr. Crane, the present esteemed Medical Officer of Health of Leicester, who has throughout afforded me much statistical information, and most courteously placed at my disposal a valuable volume of local health reports, beginning with 1851. The so-called 'heat theory', *pur et simple*, of infantile summer diarrhœa, has been glibly but erroneously charged to Dr. Crane by various writers on this subject. Beginning with 1867, Dr. Crane enunciated his so-called 'heat theory' in these words: 'This is a disease (diarrhœa) especially intractable and fatal in puny weakly children, *however that weakness may be produced*, whether it exists at birth, as it does in so many cases in large cities, arising from the debilitated condition of the parents, either constitutionally from hereditary taint, or as the consequence of vice or disease; or whether it be superinduced in a healthy infant after birth by neglect or improper hygienic treatment. This condition of the infant population in large towns is a matter of notoriety; and nowhere is it of so marked a character and so prevalent as in manufacturing towns; and it is this state, with one other special cause to be hereafter stated'—to wit, 'the heat of autumn days, followed by the chills of autumn nights'—'that, I think, will fully account for the increased number of deaths from diarrhœa in these towns, as compared with villages and non-manufacturing towns, without the hypothesis of a specific cause as generating the disease.'†

To Dr. Crane's clear statement I have added nothing but the determining influence of a continuously high local birth-rate, especially in the first two quarters of the year. Having begun as pointed out, Dr. Crane finished his report for 1878 with these consistent and expressive words: 'In conclusion, while the sanitary state of Leicester is good, the statistics of 1878 and previous years prove that diarrhœa, like bronchitis, is a meteorological accident,

* It is impossible in an article of this kind to give details of the treatment of children in Leicester. But what can we expect of mothers who are to be seen in large numbers 'reeling' out of public-houses with their infant children in their arms?

† It is remarkable that I came to the same conclusion as Dr. Crane from close personal observation in Leicester, and had expressed it in a pamphlet on 'Infantile Mortality', before communicating with that gentleman, in the following terms:—'The annual incidence of excessive heat aggravates this mortality chiefly among children of the weakly and debilitated type.'

and that the causes of our exceptionally high infantile mortality are traceable to defective social conditions.'

Never has this verdict been more remarkably verified than in the summer of 1879.* Late in July, Dr. Arthur Mitchell pointed out to the Scotch Meteorological Society, of which he is the distinguished Chairman, that the weather had not been so cold in Scotland in any summer since 1764; and 'as showing the influence of heat in producing diarrhœa, there had been in London during the past eight weeks 131, against an average of 472, deaths from that disease in the corresponding period of the last ten years'. On the other hand, the New York Board of Health found it necessary to appoint, early in July, an extra staff of district physicians, 'whose duty it is to visit tenement houses with the view of prescribing for sick children, and giving such other advice as will tend to prevent the infantile disorders usually occurring in the heated season'. What these disorders are is very clear, from a clinical lecture by Prof. Smith of Bellevue Hospital School of Medicine, New York, which appeared in the *New York Medical Record* of the 12th July 1879. Having called the students' attention to various forms of infantile diarrhœa resulting from 'too frequent nursing, preternatural acidity, dentition, errors of diet, non-digestion of sugar', etc., he comes to 'cholera infantum', which is the diarrhœa *par excellence* of England and America. 'I look', says the able Professor, 'upon cholera infantum as a disorder of the *nervous system*, and the disturbances of the alimentary canal as only the local manifestations of a constitutional disorder. It occurs from *great heat*, and "dog days" are very fruitful in the production of cholera infantum, particularly among the poor, where badly ventilated rooms and improper food favour the development of the disease.' Prof. Smith's observations, which only came into my hands as this paper was going through the press, are so important, and at the same time so identical with my own, that I cannot help quoting in full the passage from my *brochure* which deals with the case of my own child. 'I had noticed that the child suffered very much from the intense heat of the preceding day' (21st July 1878), 'and seemed greatly exhausted towards evening. I came, therefore, to the natural conclusion, and I have no reason whatever to alter my opinion, that the attack was directly due to *nervous exhaustion* from excessive heat (86°). The high activity of a child's digestive system, and its close connection with the sympathetic nervous centres which are under the direct influence of external impressions, whether exciting or depressing, is sufficient to account for a speedy alteration in the gastric and other digestive juices, and a prompt reversal of their natural functions. Such an influence is to be found in *extreme heat*, and the man who knows anything of reflex nervous action cannot fail to understand the process.' Reasoning from these premises, I concluded that if such be the action of excessive heat on a strong, well-fed, and perfectly healthy child of 15 months, what must be the consequences to those so differently circumstanced and under that age? Hence the long inquiry which is now drawing to a close. The intelligent and rational position taken up by Dr. Crane had my unconscious support, and is now seen to have the support of international medical opinion. The judgment of our contemporaries, or, at least, of posterity, will award to all engaged in the elucidation of this great question their due rewards, and I end this paper as I began, confident in the truth of the aphorism, *Magna est veritas, et prevalebit.*

POSTSCRIPT.—Simultaneously with the appearance of Dr. Johnston's article in the SANITARY RECORD of the 15th August, the *Midland Free Press* devoted a 'leader' to the Registrar-General's second quarterly report for 1879. Here is an extract:—'Coming now to the state of the public health, and more particularly as it concerns the town of Leicester, we are met by the two sets of facts which have frequently been alluded to in these columns, and which for years have perplexed and puzzled all who have given any attention whatever to the subject. That is to say, the death-rate of infants is exceedingly high, whilst that of adults is very low. "The average infant mortality in twenty large English towns was 141 per thousand of the births registered, and ranged from 93 in Portsmouth and 120 in Brighton, to 158 in Manchester and Oldham, and 197 in Leicester." This fact draws from the Registrar the observations that "the rate of infant mortality in Leicester continues as excessive as ever", being more than twice as large as that which prevailed in Portsmouth. As a set-off against this, we find the death-rate of persons aged between one and sixty years averaged 13.7 per 1,000 estimated to be living at those ages, and ranged from 9.9 in Leicester and 10.1 in Brighton, to 12.6 in Liverpool and 16.9 in Manchester: in other words, for all but infants, Leicester, so far as the death-rate can be regarded as an index, was the healthiest of all the large English towns from which reports are received by the Registrar-General. Now, we find that during the quarter of a year ending June 30, when, as the Registrar-General says, the infant death-rate in Leicester was "excessive as ever", the zymotic death-rate was lower than in fifteen out of the twenty large towns reported upon, numbering only 57 deaths for the whole quarter. The same thing, we believe, has continued in the weeks which have intervened since the Registrar's report was made up. The unusually cold weather has resulted in an almost entire absence of diarrhœa, and a very low death-rate from all causes; still, curiously enough, the weekly returns of mortality made out by our officer of health show that however low the death-rate, the proportion of children under five years of age is nearly equal to 50 per cent., or one-half of the whole number. Thus, then, neither choked-up sewers nor emissions of sewer gas can be held accountable for the infant mortality during the present season, so far as it has gone, and consequently we are driven back upon the various prejudicial influences which are at work to cause this high mortality—to the want of stamina on the part of the infants, the alleged neglect and ignorance of parents, the overfeeding, bad nursing, and administration of injurious "cordials", which all play their part in this drama of life.'

The importance of the above is enhanced by the fact that, till very recently, the *Free Press* was a staunch advocate of the 'germ theory' of infantile diarrhœa, which was supposed to be the cause of excessive local infant mortality. The article concludes as follows:—'One of the numerous remedial measures advocated in our columns from time to time is the institution of public *crèches*, or nurseries for children

* The local diarrhœa mortality in the three weeks ending the 26th July 1878 was 79, against 4 in the corresponding period of 1879; and the average temperature, as taken at the Leicester Town Museum, 63.°5 against 57.°1; the mean maximum and minimum temperature for the twenty-one days being 71.°5 and 54.°7, and 63.°2 and 51.°4 in 1878 and 1879 respectively. I am indebted to Mr. Harrison, the Curator, for these valuable facts.

whose parents work in factories or warehouses. It is to remedial measures of this kind, as well as to the dissemination of knowledge as to the proper treatment of infants, that we must look for the removal of the stigma which at present rests upon the town in regard to its infant population, and which calls forth a periodical rebuke from the Registrar-General.'

While all must regret the early retirement of the Registrar-General, many will join in the request that he perform another gracious act ere his departure from office, and that is, to erase infantile diarrhœa from the list of zymotic diseases, and so end the controversy as to its causation. On what grounds is it classified as at present? 'The great object,' says the editor of the SANITARY RECORD, on page 75 of the August number of that journal, 'to be aimed at in the publication of local mortality statistics for comparative purposes, is to secure uniformity, and thus it becomes important not to depart from the Registrar-General's practice of including diarrhœa as one of the seven principal zymotic diseases.' So far as the question of classification is concerned, Dr. Farr is Registrar-General, and here is his definition of zymotic diseases, as adopted in 1856—'Zymotic Diseases (Ζυμη, leaven): diseases that are either epidemic, endemic, or contagious; induced by some specific body, or by the want of, or by the bad quality of, food.' Having quoted this definition in a letter addressed to me on the 6th March 1879, Dr. Farr remarked, 'You will observe that I say nothing about filth in the definition, which is wide enough to embrace not only the characteristic of epidemicity and endemicity of the complaint, but the bad quality of the food.' My rejoinder was that 'the want of, or the bad quality of, food,' will induce 'chronic starvation, marasmus, debility, diarrhœa, convulsions, and kindred infantile diseases, which cannot be legitimately regarded as "zymotic diseases" in the literal sense of that term.' Dr. Farr, in his reply, did not dispute my position, but merely directed my attention to what he considered the best way of preventing infant mortality from all causes (see SANITARY RECORD, 28th March 1879). I have thought it desirable to refer, in conclusion, to the question of the classification of infantile diarrhœa, partly because there is discontent therewith in many quarters, and chiefly to indicate the source of the dispute as to its causation.

The Archbishop of Canterbury and the Bishop of London have become patrons of the Early Closing Association.

Herr Isaac Lilienfeld, a member of the Jewish community at Gotha, having expressed a wish in his will that his body should be burnt after death, the cremation was duly effected on the 14th of July.

A return of the amount of loans outstanding against urban sanitary authorities (England) for gas and water works, December 1878, has been printed. The Local Government Board in December last inquired the amount of these loans, and the replies showed that 292 of these authorities had outstanding loans for one or other or for both the objects named. The loans of 191 authorities were for water only, 67 for water and gas, and 34 for gas only. The amounts were:—191 authorities, water only, £6,998,679; 67 authorities, water and gas, £19,899,422; 34 authorities, gas only, £1,592,483;—total, £28,490,584. In a few cases of small amount the loans were for sewerage as well as water, and in two or three other cases the gas and water loans were not separated.

THE

SANITARY RECORD.

SEPTEMBER 15, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE SANITARY CONDITION OF SCHOOLS.

PROBABLY no officer of health or sanitary inspector whose attention has been given to the subject, would be found to quarrel with the strictures which we recently felt bound to pass upon the Education Department for their extraordinary disregard of the first principles of public health, in considering the plans of schools submitted for their approval. But even the veriest sceptic as to the truth of our remarks ought to be convinced when he reads the following, which we extract from a report of extreme interest made by Mr. Richard Graveley to the Chailey Rural Sanitary Authority on the sanitary condition of the schools in his district:—'The Plumpton Board School, which has been open *about two months*, has an average attendance of about forty-four. In planning these new schools, no consideration appears to have been given to the matter of ventilation. The principal room is badly lighted, the windows of which look north and west; there are no means by which air can enter into or escape from the room when the windows and doors are closed. There are conveniently arranged lavatories, but the closets are most objectionable, having a large pit at the back as a receptacle, and this being covered by a wooden flap, admits of no escape of gas except through the seats, and the stench at the time of my visit (though the closets had not then been long in use) was almost unbearable. These premises, as at present arranged, are totally unfit for the purpose for which they were built, and I have no hesitation in stating that they endanger the health of all those persons who use them.' This, two months after the erection of schools, the plans of which have been officially approved by my Lords of the Privy Council as complying with their requirements that schools receiving a grant shall be healthy, well drained, ventilated, and provided with suitable offices!

With Mr. Graveley's opinion that 'so long as the Education Department remains so indifferent to the sanitary state of schools under their control, no general improvement can be looked for', we need hardly say we entirely concur. Hardly a single school in the Chailey rural district was found to satisfy in reality the requirements of the Education Department itself. All but two were improperly ventilated, and in not a few instances the closets were constructed on utterly vicious principles. In one case the closets are reported as being 'as bad as bad

can be, the soil covering the floor of that for the girls, and running out of the doorway'.

We have already, in our issue of November 29 last, expressed at length our opinion on the apathy which permits such a state of things to continue, and we can only repeat that it is high time that some radical change in the examination of the plans of schools submitted to the department should be effected. Whether 'my Lords' are to be stirred into action by reports such as Mr. Gravely's is more than we dare affirm; but we hope the Chailey Board have sent a copy of his report to the Education Department, so that that office may at least not be able to plead ignorance of the results of its present system.

As regards one matter indeed, the Education Department have recently made some progress. It appears, from a paper which they have recently published, that their attention has been called by the Local Government Board to the evils arising from their toleration of the old midden privy system of excrement disposal. At the request of the Department, the Local Government Board have prepared a memorandum for school managers on the best means of excrement disposal for school privies, which has now been circulated, and which seems likely to be of real use. But it is not by publishing memoranda only that the Education Department can wipe off the record of careless indifference in the past; and we must repeat that a radical change is wanted in the examination of local plans of faulty buildings, which the nation helps to erect.

As the central office has been so apathetic, it is not to be wondered at if local school boards are the same. That they are so is apparent from the following case which has been communicated to us. After a considerable amount of trouble, an order was at last made some time ago by a rural Sanitary Authority in the north of England for the alteration of a very offensive nuisance at the National School. At a meeting of the Authority held a considerable time after, one of the members called attention to the fact that the alterations had not been effected, whereupon the surveyor said the matter was in the hands of a gentleman connected with the schools, who was preparing or had prepared a 'plan'. This dignified way of dealing with the matter did not satisfy the Authority, who, thinking it did not require a great expenditure of time and brains to make a 'plan' for so simple a purpose, issued an order that if the work were not done within fourteen days other steps would be taken.

The cases to which we have referred above are only types of a great many more in different parts of the country which come to our knowledge. What is the use of attempting to teach cleanliness and the laws of hygiene to a man when we compel him to send his children to a school which is unwholesome and insanitary? We do not deny that something has been done of late years to effect improvements in the sanitary condition of our schools, and that the old horrors of dame schools, whose mistresses thought 'the children thrived best in dirt', are things of the past. But there are still schools to which the description given by Mr. Ridall Wood more than forty years ago would almost apply, and the sooner sanitary authorities deal with them with a firm hand the better.

As was recently said by that eminent sanitarian, Dr. Ezra M. Hunt, in his report on the Home and School in their Relations to Health:—'It is a deep, broad, and high concern of society whether the boys and girls who, at the age of five, crowd to the schoolhouse door, and are seated in the schoolroom for a period reaching over ten or twelve years, are there to find those aids to physical health to which they are entitled by nature, and which involve so much as to the effectiveness of their future citizenship.'

NOTES OF THE MONTH.

VITAL STATISTICS OF MONTREAL.

There is again a strong agitation in Montreal to make vaccination compulsory, and evidently not without reason. From a report just issued by Dr. Larocque, the health officer of the city, it appears that more deaths arise from small-pox than from all other diseases combined, and for the week ending July 19 last there were no less than 121 deaths from small-pox in the city. The vital statistics given in Dr. Larocque's 'Fourth Annual Report of the Sanitary Condition of Montreal' are of some interest. The proportion of births among the French Canadians is 59.25 per 1000 of the population, while the proportion among the English-speaking Roman Catholics is 37.71, and among Protestants 31.01. The number of marriages per 1000 of the French-Canadian population is 13.17, of English-speaking Catholics 7.26, and of Protestants 8.16. The death-rate among the first-named class of the population is 38.96, of the second 24.70, and of the third 17.97. It may be remarked that the second class is almost wholly Irish. The proportion of deaths is lower this year than it has ever been since 1873, being 30.51 as against 35.05 last year. There were 728 deaths from small-pox during the 12 months embraced in the report.

THE LONDON WATER-SUPPLY.

Dr. Whitmore, in his last report to the Vestry of St. Marylebone, states that by comparison with previous years the quality and composition of the Thames water supplied by the West Middlesex and Grand Junction Water Companies has been fully maintained. With regard to the metropolitan water supply, the very important question as to the desirability or fitness of its present sources, its quantity, quality, modes of distribution, and cost, continue to be, as they have been for some years past, a matter of difference of opinion, and out of this there has undoubtedly grown, in the minds of the public, a feeling that our water supply, at least that from the river Thames, is more or less polluted and unfit for drinking purposes, that its present mode of distribution is also objectionable, and that an extravagant price is charged for it. The suitableness of the river Thames as a source of supply has been fairly tested for years, and there is evidence showing the

improbability of the supply being diminished. There is no evidence to show that when drank in the condition sent to the consumer, through the water companies' mains, that it is calculated to cause epidemic disease, or increase the death-rate of those using it. That polluted water has in most instances caused cholera, fever, diphtheria, and diarrhœa is certain, and that in several instances the water was drawn from the river Thames; but the pollution, not being a constituent of the water, did not come with it, but was imported into it after having been delivered to the consumer.

THE INCREASE IN LUNACY.

Dr. Lush, the President of the Medico-Psychological Association, in the course of an address recently delivered to the members, drew attention to a marked increase of late years in lunacy. In the first report of the Commissioners in Lunacy they state that in June 1846 there were in England and Wales 23,000 persons of unsound mind. The population then was about 17,000,000, now it is 25,000,000, and it is estimated that on the 1st of January 1879 there were 70,823 persons in England and Wales who needed the protection of the Lunacy Laws. It appears, therefore, that while the population has increased at the rate of 45 per cent., the number of lunatics in detention has risen at the rate of 250 per cent. Assuming that another 33 years will yield similar results, accommodation will have to be provided in 1912 for nearly a quarter of a million of insane or imbecile persons in England and Wales. The true solution of the difficulty, he thought, is to be sought —1, in increased family responsibility; 2, in educating the popular belief in the gravity of the disease itself; 3, in further State interference where possible; 4, in increased efforts to make the lot of insane persons under detention as little irksome as is consistent with safety and the conditions of their malady. Beyond these, he feared, not much can be done or hoped for; less ought not to be required; and if, instead, a callous indifference continues to prevail as to the extent of insanity, grave and calamitous results, to be discovered only when too late to be repaired, must follow a neglect of the accepted teachings of medical science and experience.

THE METROPOLITAN BOARD OF WORKS AND OFFENSIVE BUSINESSES.

By the provisions of the Slaughter-house Act, 1874, the Metropolitan Board of Works are empowered to make bye-laws for the regulation of slaughter-houses, and of premises used by knackers, tripe-boilers, blood-boilers, bone-boilers, soap-boilers, tallow-melters, manure manufacturers, fellmongers, and any other businesses which the Board may declare, and the Local Government Board may confirm as being offensive trades. Under these powers the Metropolitan Board have made bye-laws for slaughterers of cattle, soap-boilers and tallow-melters, manure manufacturers, blood-boilers, tripe-boilers, bone-boilers, catgut makers, glue and size makers, blood-driers, and fat-melters, and in their annual report, lately issued, give an account of the steps taken to prevent nuisances arising from these premises. The report for 1878 shows that there are 948 slaughter-houses under their supervision, that 12,000 inspections were made of these premises during the year, whilst in eight cases only was it necessary to take out summonses. Applications for three new slaughter-houses have been granted and three refused, and one application was made for a license to kill horses for human food, but, as the premises were unfit, the application was not granted. The nuisance from soap-boiling and tallow-melting has been much reduced by carrying the vapours from the boiling fat into the furnace and consuming them, and especially by drawing off the melted fat and pressing the residue into greaves in a close chamber and carrying the effluvia into the furnace. In one case only was it necessary to take legal proceedings for enforcing these bye-laws. The manure manufacturers have, however, not complied so generally with the bye-laws, and there appears to be some practical difficulty in dealing effectually with this nuisance; but it is hoped that a plan which has been adopted by the largest manure works in the south of England will prove effectual. What that plan is we are not informed; but it is admitted that it is difficult, especially for the small manufacturers, to make the necessary alterations in their premises. The Board seems to be very tender of these manufacturers, and we hope that a better account will be given in the next report. The premises occupied by tripe-boilers and bone-boilers have been much improved, greater care and cleanliness being observed in the conduct of these businesses, and heavy penalties were recovered from one bone-boiler who had not complied with the bye-laws. As to the catgut manufacturers, smaller improvement has been obtained than otherwise would have been, as the most offensive part of the business is the scraping and preparing the gut, which is chiefly used for sausage-skins and can hardly be included in the term 'catgut', so that this process, when carried on by the smaller manufacturers who do not make catgut, is, at present, not much modified. One prosecution was successfully instituted against a catgut manufacturer. The bye-laws regulating the businesses of glue and size makers, blood-driers, and fat melting have been submitted to, but are not yet confirmed by, the Local Government Board.

LEAD-POISONING BY WATER-PIPES.

A case of lead-poisoning, caused by water-pipes, is published in the *Revue d'Hygiène* by M. Moizard. In April 1877 he was consulted by a patient with dyspeptic symptoms who had just moved into a new house, and grew gradually better till about the middle of September, when he became very ill. This time the symptoms were clearly those of lead-poisoning; the blue line along the gums was distinctly visible, not only in the patient, but also in the whole family and the servant. It was evident that the entire household had been poisoned by lead, and they only recovered after six months' treatment. It seemed at first impossible to discover in what way the poison had been introduced into the system. The bread and water were analysed without obtaining any results; the paper on the walls in the patient's bedroom was found to contain a certain proportion of the poison, but as the patient had improved, although the paper had not been changed, it was clear that that could not be the *corpus delicti*. At last the following hypothesis was suggested:—The water is distributed all over the house where the poisoned family lives, and yet none of the other lodgers showed any symptoms of lead-poisoning. It was, however, laid on only in January 1877, and from this time until April the apartment now occupied by the family in question had not been uninhabited. It is well known that lead pipes become perfectly harm-

less after a certain time, as an insoluble precipitate of carbonate of lead and carbonate of lime forms in them, which incrusts them, thereby preventing the lead from coming into contact with the water. It seems that in these new pipes the incrustation had not yet had time to form, so that the first water which was drawn must have been impregnated with a considerable proportion of oxide of lead, the cause of all the accidents. At the time when the water was analysed the lead had already disappeared from the water, and the pipes had again become harmless, although the effects of the poison had remained. This case shows how very important it is, on going to live in a new house, to allow the water from the pipes to run freely for some time before using it, and to find out when it was laid on, and how long the pipes have remained unused.

THE INFLUENCE OF POLLUTED WATER ON THE HEALTH.

In the fourth part of the *Zeitschr. f. Biol.*, 1878, Dr. Emmerich has published a very curious paper on the influence of polluted water on the health. He is a strong partisan of the views of Pettenkofer, Port, Vogt, etc., who have assumed that water has little if any influence on the origin and spreading of epidemics. The author first endeavoured to show by experiments on animals what would be the effects of polluted water on the healthy animal organism. The water was injected under the skin of animals, and produced symptoms of blood-poisoning. Herr Emmerich, however, was not satisfied with his results, but proceeded to test the effects of the polluted water on himself, by drinking it in large quantities. He was suffering from a gastric catarrh when he first began, and affirms that not only did the affection not become worse, but even better. Two gentlemen followed his example, and heroically drank the bad water without the least bad effect. The author concludes by saying that polluted water would only produce bad effects on persons who would feel disgusted at the sight of the impurities contained in the water, and that they would invariably be sick, while others who were able to suppress their feelings of disgust, 'which every educated person ought to do', might swallow all the filth, etc., contained in the water without experiencing the least bad result to their health. The author expresses a hope that his investigations will be taken up and carried out more thoroughly by others; but we fear that there will be some difficulty in finding educated persons of a sufficiently stoical turn of mind to do this.

SCURVY IN THE MERCHANT SERVICE.

By order of the House of Commons, the Board of Trade have recently issued a Parliamentary paper containing a series of reports made to that department as to cases of scurvy which have occurred on board British ships since 1876. The particulars, being set out in a tabular form, deal with the subject very fully. The most interesting and noteworthy fact, however, in the report is that out of 206 cases of scurvy, fifty-nine, including three deaths, are attributed to the fact that the lime juice was not properly served out, or that the men refused to take it, or that there was none on board, or that it had run short, or else that it was of inferior quality. The last point deserves particular attention, as sixteen cases are attributed to this cause. The fact of this being so, shows that under the present system it is possible for lime juice of inferior quality to be supplied; and this is due, without doubt, to the present process adopted for sampling and fortifying the article. Dr. Harry Leach, to whom is due the Merchant Shipping Act of 1867, was extremely anxious at that time that every care should be used to insure the quality being as it ought to be, but for economical reasons it was put into the hands of the customs, and the process adopted is certainly open to great objections, and this will be readily admitted by any one acquainted with the matter. Another important point is that throughout the report lime juice is referred to, but it may, perhaps, astonish many to know that but little lime juice is really used, that term covering lemon juice (which is almost entirely supplied), which is by no means so valuable an anti-scorbutic, this being clearly proved before the Arctic Commission, and this being the expressed opinion of the medical officers of the Board of Trade. Dr. Leach was exceedingly anxious at the time of the passing of the Act that only lime juice should be allowed, but a difficulty was felt as to the possible supply of that article being sufficient. The sources of supply of lime juice now, however, being much greater than they used to be, and quite sufficient for any requirements, it surely is the duty of the Board of Trade to alter the Act in this respect, and to order that lime juice only should be supplied, and to adopt such measures as will insure the quality being as it ought to be, so that in their next report there may not be such a large percentage of cases of scurvy directly due to the bad quality of the lime juice. It is worthy of notice that the Admiralty have been for many years most particular in having only lime juice, to the total exclusion of lemon juice, requiring a guarantee that it is gathered in certain months of the year, and thus not only insuring greater citricity, but also superior flavour and condition, a more important element than is often imagined, and the result has been that scurvy is practically unknown in the British navy.

VACCINATION IN LEEDS.

Mr. Holmes, the vaccination officer, in his report to the Leeds Board of Guardians, gives the following interesting particulars:—The births of 3,109 children were returned to me by the district registrars. Of this number 2,647 were vaccinated, being 85.1 per cent. of the births; 391 died unvaccinated, this being 12.5 per cent.; 17 are postponed, being 0.5 per cent.; 10 have removed to other places (and the officers have been advised), these are 0.3 per cent.; 38 have not been traced, amounting to 1.1 per cent. The unsusceptible and refusals are 0.1 per cent. Not one child was returned as having had small-pox. It will be seen from these figures that the whole of the 3,109 children are accounted for except a little over 1 per cent. The administrative machinery of the Vaccination Acts can only be made a success by their judicious application; and hitherto results have been produced which have not only proved beneficial to the population in the past, but may also be regarded as a safeguard in the future; and it is gratifying to know that the desired end is attained of suppressing one of the most loathsome and fatal of the zymotic diseases. Out of the 2,647 children vaccinated, 1,593, or 60.1 per cent., were operated upon by the public vaccinators. Not a death occurred from small-pox within the township during the half year. The last that took place was in July 1877; and the light expense of the small-pox hospital for some time past is also, from a pecuniary point of view, a matter of

consideration. No cases of the disease have arisen requiring removal thereto; thus the reduction of the money cost to the union is one of congratulation. Stronger evidence could not be adduced as to the efficacy and protective power of vaccination in checking small-pox than is to be found in the facts just mentioned. Out of the 3,109 children born, only against four parents had legal proceedings to be taken, and in one of the cases the father had been previously fined for another child.

FOWL-CROUP AND TYPHOID FEVER.

The circumstances attending the death of John Phillips recently formed the subject of an official inquiry at Brentford, and deserve a brief notice in these columns. According to the report furnished to us, it appears that the landlord of the Railway Tavern, Acton, finding that one of his fowls was suffering from 'croup', ordered it to be killed and buried; these instructions were, however, not carried out, but one of the tavern servants gave the fowl to Phillips, who took it home and had it cooked for dinner. Phillips, who was a labourer, aged sixty-five, and his wife and daughters and five other persons partook of the fowl, and all suffered from the effects within a short period, the symptoms being diarrhœa, vomiting, and pain in the head. All recovered except the deceased, the subject of inquiry. The finding of the jury was that the cause of death was typhoid fever, brought on by eating a portion of a diseased fowl. It is hardly necessary for us to remark on the unwisdom of the jury in this case, in attempting to give a name to the disease which caused death, as, if the deceased succumbed owing to the unwholesome food he had received into his stomach but a few hours before, he certainly did not die of typhoid fever. The obvious lesson the public should learn from the fatality is, that it is neither safe nor economical to eat the flesh of birds or beasts which have been killed on account of acute disease. To medical officers of health and pathologists the question will probably occur—what was this 'croup' that proved so deadly? and the answer is not easy to arrive at. Indeed 'croup', as applied to poultry, appears to be quite a common term, and one used to express a symptom rather than a specific disease—that is to say, almost any fowl disease in which the subject affected gives utterance to a harsh guttural cry at short intervals is likely to pass for croup. Perhaps one of the most common of these is an aphthous affection of the mouth and throat, but this is generally regarded as mild and tractable. Then there is the singularly fatal malady known as fowl-cholera, in which the mouth and windpipe are often found clogged with a viscid mucus, rendering respiration difficult and croupy. It is probable, also, that in some cases of anthrax the breathing may become noisy and metallic in character, through swelling in the soft parts round the larynx. In the case of either cholera or anthrax, the flesh of the affected bird would certainly be quite unfit for human food, and flesh tainted with anthrax would be not unlikely to produce symptoms identical with those manifested by the unfortunate man Phillips. That poultry are liable to a disease bearing any real resemblance to human croup, and accompanied by the formation of a false membrane, is not, we believe, credited by the best authorities in veterinary medicine.

THE NEW REGISTRAR-GENERAL FOR IRELAND.

We are very gratified at the appointment of Dr. Grimshaw to this office. It is one which will give unqualified satisfaction to the medical profession and the public. It was generally felt that the important department of vital statistics ought to be presided over by a physician, and by the selection of one the Government were enabled, in the case of the late Dr. Burke, to dispense with the office of medical superintendent, and thus effect a saving of £600 a year. The same advantage is now obtained, while securing the services of a distinguished physician, and who has also devoted special attention to sanitary subjects. The salary attached to the office is £1,000 per annum.

THE DISCONNECTION OF CISTERN PIPES.

We are glad to learn that the New River Company has just enforced a very useful change in the Holloway district, supplied by them. They have caused all cistern overflow pipes to be diverted or cut off from immediate connexion with the water-closets or drain, thus preventing the poisoning of the water by sewage gases. This is one of the most enlightened measures which has ever been put into practice by any water-company, and is likely to prevent much zymotic disease. We hope to see this excellent example followed by the other companies in the districts under their jurisdiction.

ENTERIC FEVER AT SWANSEA.

We regret to have to record a sudden and very severe outbreak of enteric fever at Swansea, something like 500 cases and 25 deaths having already occurred. The cause of this startling visitation is being diligently worked out by the Medical Officer of Health, Mr. Ebenezer Davies, but we believe nothing definite has as yet been arrived at. Shortly before the epidemic began there was a heavy thunderstorm and rainfall in the place, and it is conceivable that this may in some way have washed enteric fever poison into the water reservoir of the town. It may, however, safely be left in the hands of Mr. Davies to work out the problem in the best possible way. All necessary remedial measures have been adopted by the local authority, and at the time we write there seems reason to hope that the epidemic is beginning to die out.

METEOROLOGY OF AUGUST.

The prevailing features of the weather, during August, differed but slightly from those of July; they were low temperature, frequent and abundant rain, and a small proportion of recorded bright sunshine. The following figures and remarks are based upon the observations at the Royal Observatory, Greenwich, published by the Registrar-General.

The mean reading of the barometer during August was 29.67 inches, and was 0.12 below the average reading for the corresponding month in 37 years. The highest reading during the month was 29.98 on the 2nd, and the lowest 29.32 on the morning of the 17th, which was an exceptionally cold day, with much rain.

The mean temperature of the air during the month was 59°.9, and although 1°.8 above the exceptionally low temperature during July was 0°.9 below

the average mean temperature during the corresponding month in 100 years. The mean exceeded the average during the five days, 11th to 15th inclusive, and a slight excess also prevailed on 1st, 20th, and 21st; whereas, on each of the other 23 days of the month the mean temperature was below the average. The coldest day of the month was Sunday 17th, when the mean temperature was only 52°.3, and 9°.6 below the average. The mean temperature last month was lower than in the August of any year since 1866, when it was only 59°.4. In the five years ending 1866, there was a succession of cold Augusts, as in four of those five years the mean temperature of the month was below 60°.0, which did not occur once in the next twelve years ending 1878.

Rain was measured on 20 of the 31 days of August to the aggregate amount of 5.2 inches, which exceeded the average amount in the corresponding month of 61 years by no less than 2.8 inches. This heavy rainfall was slightly exceeded in August 1878, when 5.4 inches were measured on nineteen days; the fall in that month was, however, larger than that recorded in any August since 1815—the first year for which records exist at the Royal Observatory. The rainfall of the three months ending August last amounted to no less than 13.2 inches, measured on 59 of the 92 days in June, July, and August. The average amount for these three months is but 7 inches, and so heavy a rainfall as that recorded during the past summer is certainly without parallel in recent years.

During August, 139.1 hours of bright sunshine were recorded during the 449.1 hours that the sun was above the horizon. August was not so sunless as July, when only 99.3 hours of sunshine were recorded; it compared, however, unfavourably with the Augusts of 1877 and 1878, when the recorded hours of sunshine were 158.6 and 160.0 respectively.

THE PUBLIC HEALTH

IN THE FOUR WEEKS ENDING 30TH AUGUST 1879.

THE public health during August, judged by the weekly mortality statistics published by the Registrar-General, was scarcely less favourable than it had been during July.

In twenty of the largest English towns, containing nearly a third of the entire population of England and Wales, 20,384 births and 10,399 deaths were registered during the four weeks ending 30th August. The births exceeded by 428, whereas the deaths were no less than 3,491 below, the number returned in the corresponding four weeks of 1878. The deaths included 2,147 which were referred to the seven principal zymotic diseases, against 4,336 in the corresponding period of last year; 952 resulted from diarrhœa, 410 from scarlet fever, 287 from measles, 284 from whooping-cough, 139 from fever (including typhus, enteric, and simple), 55 from diphtheria, and 20 from small-pox. Compared with the numbers recorded in August 1878, the fatal cases of measles were considerably more numerous, whereas the deaths referred to each of the six other zymotic diseases showed a marked decline. The 2,147 deaths registered from these seven diseases during the four weeks of August were equal to an annual rate of 3.8 per 1,000 persons living in the twenty towns; in the corresponding four weeks of 1878 the death-rate from these diseases was equal to 7.8 per 1,000. This marked decline in zymotic fatality in the twenty large towns last month was almost entirely due to the unusually small fatality of summer diarrhœa. The zymotic death-rate during August did not exceed 1.1 in Plymouth, 1.3 in Hull, 1.5 in Portsmouth and Brighton, and 1.6 in Wolverhampton. It ranged upwards in the other towns to 3.6 in Salford, 3.8 in Sunderland, 3.9 in Leeds, 4.2 in Leicester, 4.4 in Liverpool, and was highest, 4.6, in London. The high zymotic death-rates in London, Leicester, Leeds, and Salford were principally due to diarrhœa fatality, while scarlet fever caused a proportionally large number of deaths in Liverpool and Sunderland. The deaths from measles, which were 198 in London, did not exceed 89 in the nineteen provincial towns, having a slightly larger aggregate population. Of the 55 deaths referred to diphtheria in the twenty towns, no less than 38 occurred in London, against but 17 in the nineteen other towns. Whooping-cough was slightly more fatal during August than it had been during July, the rate of mortality in London being almost the same as in the nineteen other towns. Fever, principally enteric, caused 139 deaths during the four weeks of August, of which 66 were recorded in London. The deaths from fever in these twenty towns in the corresponding four weeks of 1878 were 244. Fever fatality last month was therefore 43 per cent. below that recorded in August 1878, and was probably lower than in any previous corresponding month. Small-pox caused 20 more deaths in London, whereas no fatal case occurred in any of the nineteen large provincial towns. The number of small-pox patients in the metropolitan asylum hospitals, which was 108 on 2nd August, after a decline to 96 on the 9th, rose again to 111 on the 23rd, and was 103 on the 30th. The weekly number of cases of small-pox admitted to these hospitals, which had been 47 in June, and only 21 in July, increased to 25 in August.

The remarkable immunity from the fatality of infantile summer diarrhœa, which prevailed during July, was also conspicuous in August. The deaths referred to diarrhœa in the twenty towns during the four weeks ending 30th August were but 952, against 2,986 in the corresponding period of 1878; the fatal cases of this disease during last month were 2,034 less than in August 1878. The annual death-rate from diarrhæa, which in August 1878 was equal to 5.4 per 1,000 persons living in the twenty towns, did not exceed 1.7 in the four weeks ending 30th ultimo. In London the death-rate from diarrhœa last month was equal to 2.2 per 1,000, whereas it did not exceed 1.2 in the nineteen provincial towns. In 1860, when the summer temperature was remarkably low and somewhat lower than that in 1879, the annual rate of mortality from diarrhæa in London was so low as 1.6 per 1,000, since which there has been no near approach to so low a fatality from diarrhœa in London as that recorded last month. That the rate of mortality from this disease in London during last month should, however, have so considerably exceeded the rate in the nineteen provincial towns, is unusual, and somewhat difficult of explanation. Diarrhœal fatality during the past summer in some of the continental and most of the American cities has shown its normal excess, especially in Berlin, New York, Brooklyn, Philadelphia, and Baltimore.

The annual rate of mortality from all causes per 1,000 of the nearly seven and a half millions of persons estimated to be living in the twenty towns, which had been equal to 25.7, 22.0, 19.1 and 17.7 successively in the four preceding months, was 18.4 during the four weeks ending 30th August. In the corresponding periods of the three years 1876-7-8,

the death-rate in those towns averaged 24.8, 20.9, and 24.9 per 1,000 respectively. It appears, therefore, that in August as well as in July the English death-rate, judged by the mortality statistics of the twenty largest towns, was almost unprecedentedly low. If the usual relative proportions, prevailing during the third quarter of the year, between the death-rate of the twenty towns and that of the whole country was maintained, it may be estimated that the general death-rate in England and Wales during August did not exceed 15.9 per 1,000, while in July we estimated it at not more than 15.3.

The lowest annual rate of mortality during August in the twenty large towns was 12.8 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow :—Wolverhampton, 12.9; Brighton, 13.7; Sheffield, 15.8; Hull, 15.8; Bradford, 15.8; Birmingham, 16.0; Bristol 16.5; Plymouth, 16.5; Norwich, 16.8; Nottingham, 17.2; Oldham, 17.2; Leicester, 18.1; London, 19.0; Leeds, 19.6; Salford, 19.7; Sunderland, 19.7; Newcastle-upon-Tyne, 19.9; Manchester, 20.1; and the highest rate during the week, 20.6, in the borough of Liverpool. The rate which was, owing to the fatality of diarrhœa, equal to 19.0 per 1,000 in London, did not exceed 17.7 in the nineteen large provincial towns, which corresponded with the rate that prevailed in these towns during July. The high death-rates in Manchester and in Newcastle-upon-Tyne were not due to excessive fatality of zymotic diseases, which was below the average in both these towns.

The Registrar-General's weekly mortality statis-

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Four Weeks ending Aug. 30th, 1879. Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000. All Causes.	7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns .	7,383,999	20,384	10,399	2147	18.4	3.8
19 Provincial Towns	3,763,131	10,483	5,114	863	17.7	3.0
London (Reg. Gen.) .	3,620,868	9,901	5,285	1284	19'0	4.6
Brighton (borough) .	105,608	226	111	12	13.7	1.5
Portsmouth (borough)	131,821	303	129	15	12.8	1.5
Norwich (borough) .	85,222	196	110	13	16.8	2.0
Plymouth (borough).	74,303	189	94	6	16.5	1.1
Bristol (city) . . .	209,947	597	265	52	16.5	3.2
Wolverhampton (borough)	75,100	185	74	9	12.9	1.6
Birmingham (borough) .	388,884	1,127	476	90	16.0	3.0
Leicester (borough) .	125,622	406	174	40	18.1	4.2
Nottingham (borough)	169,396	440	223	39	17.2	3.0
Liverpool (borough) .	538,338	1,595	851	183	20'6	4.4
Manchester (city) .	361,819	986	557	71	20.1	2.6
Salford (borough) .	177,849	554	268	49	19'7	3.6
Oldham (borough) .	111,318	312	147	18	17.2	2.1
Bradford (borough) .	191,046	463	232	39	15.8	2.7
Leeds (borough) .	311,860	866	469	94	19.6	3.9
Sheffield (borough) .	297,138	814	360	64	15.8	2.8
Hull (borough) . .	146,347	460	177	15	15.8	1.3
Sunderland (borough)	114,575	360	173	33	19.7	3.8
Newcastle-upon-Tyne (borough) . .	146,948	404	224	21	19.9	1.1

tics do not afford the means for comparing the mortality from diseases of the respiratory organs in the various large towns. This information is only published for London, where 634 deaths were referred to those diseases during the four weeks of August, and were 79 above the corrected average number in the corresponding period of the last ten years. The fatality of these diseases in London last month, owing probably to the low temperature and the abundant rains, showed an excess upon the corrected average equal to 15 per cent., against an excess of 19 per cent. in July. It is probable that if the Registrar-General's urban mortality statistics enabled us to calculate the rate of mortality from these diseases in each of the twenty large towns, much light might be thrown upon variations in death-rates that are now difficult to explain. The high death-rates last month in Manchester, and in Newcastle-upon-Tyne, are probably, to a considerable extent, due to excessive fatality from these diseases.

In inner or registration London, the death-rate from all causes in August was equal to 19.0, and from the seven zymotic diseases to 4.6 per 1,000 of the population. The zymotic death-rate in London showed an excess equal to 53 per cent., compared with that which prevailed in the nineteen large provincial towns. In the outer ring of suburban districts around London (having a population estimated at little short of a million persons), the annual death-rate from all causes did not exceed 14.0 in the four weeks under notice, and the zymotic rate was but 1.7 per 1,000.

HEALTH OF OTHER URBAN SANITARY DISTRICTS IN AUGUST.

It is with great pleasure that we are enabled, through the co-operation of the several medical officers of health, to publish uniform mortality statistics for August relating to 55 urban sanitary districts, containing in the middle of this year an estimated population of 1,767,127 persons. It is gratifying to find that there is an increasing readiness on the part of medical officers of health to supply the uniform statistics which we are endeavouring to place before our readers, with a view to afford trustworthy indication of local sanitary condition.

The table published in our last issue contained statistics for July, relating to 36 urban sanitary districts. The table for August furnishes similar statistics from 32 of the 36 medical officers of health who contributed to the July table, and also from 23 others, who now co-operate for the first time, and offer to furnish similar statistics in future. The returns from Bilston, Bolton, Hanley, and Longton for August have not, however, come to hand in time for publication, although statistics for July were received from these towns, and published in due course. Among the largest of the urban sanitary districts now added to our list for the first time may be mentioned Accrington, Burslem, Rotherham, Swansea, Warrington, and Wednesbury, all important town centres. In all, cards and circulars were addressed on the last day of August to the medical officers of health of 82 sanitary districts, for 55 of which we now publish the requested mortality statistics. We have had several promises of further assistance in future, and we have therefore good grounds for hoping that our endeavour to secure the publication and interchange of uniform mortality statistics for sanitary districts will receive increasing support from month to month.

The annual birth-rate in 50 of these 55 sanitary districts averaged 34.0 per 1,000 during August, against 36.0 in the twenty larger towns dealt with in the Registrar-General's Weekly Return. In five cases the medical officers of health have been unable to supply the numbers of births registered during the month; this is to be regretted, as the number of births supplies the best standard for

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Deaths under one year of age to 1,000 births	Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs		
Accrington	30,000	83	40	13	3	3	2	10	—	4	—	—	1	—	—	2	1	4	4	—	—	32.6	15.7	1.6	1.6	157	J. Ewart.
Ashford	10,000	28	9	—	2	—	1	6	—	1	—	1	—	—	—	—	—	1	3	—	—	33.0	10.6	1.2	1.2	—	W. H. Coke.
Aston Manor	51,408	164	49	20	3	4	1	13	8	7	—	2	1	1	1	1	1	7	5	5	—	37.6	11.2	1.6	1.6	122	H. May.
Bangor	7,820	*	10	3	—	—	1	—	6	—	—	—	—	—	—	—	—	2	—	1	—	*	15.1	0.0	3.0	*	H. Rees.
Barnsley	30,000	89	54	10	10	*	*	*	12	7	—	1	2	—	—	1	3	4	16	1	8	34.9	21.2	2.7	1.6	112	M. T. Sadler, M.D.
Batley	28,721	83	32	16	4	3	2	4	3	3	—	—	1	—	—	—	2	3	3	—	—	34.0	13.1	1.2	1.2	193	W. Bayldon.
Belper	10,000	*	11	2	2	3	1	—	3	3	—	—	1	—	—	2	—	2	1	—	1	*	13.0	3.5	2.4	*	R. G. Allen.
Bilston	24,188	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	W. M. Hancox.
Bingley	9,000	25	12	1	1	—	2	3	5	3	—	—	—	—	1	2	—	—	2	—	—	32.7	15.7	3.9	0.0	40	J. W. Craig, M.D.
Bolton	105,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	E. Sergeant.
Bootle-cum-Linacre ...	25,500	83	35	13	13	1	1	6	1	8	—	1	2	—	—	—	5	8	2	—	1	38.3	16.2	3.7	3.7	157	R. J. Sprakeling.
Boston	15,000	36	25	9	—	1	3	4	8	1	—	—	—	—	1	—	—	4	4	1	3	28.3	19.6	0.8	3.1	250	W. Clegg.
Burslem	28,763	74	36	11	3	3	2	12	5	4	—	1	—	—	—	1	2	8	3	1	—	30.3	14.7	1.6	3.3	149	J. M. Taylor.
Bury St. Edmunds ...	15,600	43	16	2	1	1	1	3	8	—	—	—	—	—	—	—	—	3	2	—	3	32.5	12.1	0.0	2.3	47	F. W. Clarke.
Cambridge	34,000	50	30	6	1	1	4	7	11	1	—	—	—	—	—	—	1	3	6	1	4	17.3	10.4	0.4	1.0	120	B. Anningson, M.D.
Canterbury	20,692	67	28	4	4	2	5	7	6	2	—	2	—	—	—	—	—	5	3	—	5	38.1	15.9	1.1	2.8	60	F. Wacher.
Cardiff	80,150	271	97	26	10	6	6	33	16	9	—	—	4	—	1	—	4	10	13	10	10	39.8	14.3	1.3	1.5	96	H. J. Paine, M.D.
Carnarvon	10,299	32	14	5	1	—	—	5	3	—	—	—	—	—	—	—	—	3	—	3	4	36.6	16.0	0.0	3.4	156	H. Rees.
Cheltenham	45,000	82	39	6	—	2	1	7	23	1	—	—	—	—	—	1	—	4	2	—	9	21.5	10.2	0.3	1.0	73	T. Wright, M.D.
Colchester	28,633	67	27	4	2	1	3	11	6	3	—	—	—	—	—	1	2	3	3	1	9	27.5	11.1	1.2	1.2	60	E. Waylen.
Coseley	23,000	70	20	7	4	—	—	2	7	1	—	—	—	—	—	—	1	5	1	—	—	35.8	10.2	0.5	2.6	100	J. Eagleton.
Coventry	41,000	111	51	13	4	4	1	12	17	6	—	1	1	—	—	1	3	10	1	—	2	35.2	16.1	1.9	3.1	117	M. A. Fenton, M.D.
Croydon	69,500	190	81	21	9	6	3	23	19	10	—	2	—	1	2	1	4	9	6	3	11	32.2	13.7	1.7	1.5	111	C. W. Philpot, M.D.
Derby	80,385	302	143	49	27	*	*	*	28	23	—	—	17	—	1	1	4	21	9	8	14	44.2	20.9	3.4	3.1	162	W. Iliffe.
Devonport	50,000	*	40	7	4	2	2	14	11	3	—	3	—	—	—	—	—	6	4	2	9	*	9.4	0.7	1.4	*	J. May, junr.
Dewsbury	31,000	59	50	*	*	*	*	*	*	2	—	—	2	—	—	—	—	*	*	2	11	22.4	19.0	0.8	*	*	W. F. Watts.
Dover	33,028	85	45	13	2	4	2	9	15	4	—	1	—	—	1	1	1	6	4	2	5	30.3	16.0	1.4	2.1	153	M. K. Robinson, M.D.
Glossop	17,072	46	20	2	1	3	1	4	9	—	—	—	—	—	—	—	—	3	3	—	—	31.7	13.8	0.0	2.1	43	J. Rhodes.
Halifax	71,500	191	120	27	21	19	*	*	*	20	—	—	11	—	1	3	5	31	12	—	15	31.5	19.8	3.3	5.1	141	D. Ainley.
Hanley	48,091	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. S. Walker, M.D.
Ilfracombe	5,300	14	5	1	—	1	1	—	2	—	—	—	—	—	—	—	—	1	—	—	—	31.1	11.1	0.0	2.2	71	E. J. Slade-King, M.D.
Jarrow	22,000	88	26	7	4	6	3	6	—	5	—	—	—	1	—	2	2	4	6	—	—	47.1	13.9	2.7	2.1	80	J. Spear.
Keighley	27,000	87	25	5	1	3	2	12	2	5	—	2	1	—	—	1	1	3	6	—	2	37.9	10.9	2.2	1.3	57	A. Roberts.
Kidderminster ...	22,000	60	39	6	16	1	1	10	5	13	—	10	2	—	—	—	1	7	4	—	1	32.1	20.9	7.0	3.7	100	D. Corbet.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF AUGUST 1879—*continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Deaths under one year of age to 1,000 births	Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs		
Leigh	20,400	64	20	9	2	1	1	6	1	6	—	—	—	—	2	1	3	1	3	2	—	36.9	11.5	3.5	0.6	141	J. Hall.
Littlehampton	4,032	9	2	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	26.3	5.9	0.0	0.0	0.0	C. Kelly, M.D.
Longton	23,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Weaver, M.D.
Lytham	5,000	16	5	1	1	—	1	2	—	1	—	—	—	1	—	—	—	1	2	—	—	37.6	11.8	2.4	2.4	63	W. E. Pountney, M.B.
Merthyr Tydfil ...	50,350	128	61	17	3	6	5	15	15	2	—	—	—	—	1	2	—	4	11	—	2	29.9	14.3	0.5	0.9	133	T. J. Dyke.
Newcastle-under-Lyme	18,000	62	19	7	1	1	1	5	4	1	—	—	—	1	—	—	—	—	—	—	—	40.5	12.4	0.7	0.0	113	St. J. Edwards, M.D.
Oldham	111,318	312	147	29	31	7	6	47	27	18	—	1	9	—	2	—	6	16	19	5	13	36.4	17.2	2.1	1.9	93	J. M. Sutton, M.D.
Penzance	11,000	20	9	—	—	—	1	3	5	1	—	—	—	—	—	1	—	1	1	—	—	21.4	9.6	1.1	1.1	—	J. Symons (Deputy).
Preston	87,600	264	134	49	25	*	*	26	20	24	—	1	2	—	—	—	21	24	9	2	2	35.5	18.0	3.2	3.2	186	H. O. Pilkington.
Redditch	9,686	19	9	4	3	—	—	1	1	5	—	1	—	—	—	—	4	1	—	—	—	23.1	10.9	6.1	1.2	211	H. M. Page.
Rochdale	71,199	202	86	28	19	6	6	13	14	11	—	—	2	1	—	1	7	10	8	5	2	33.4	14.2	1.8	1.7	139	J. M. Wilson, M.B.
Rochester	18,352	68	27	8	4	1	1	4	9	1	—	—	—	1	—	—	—	4	2	1	7	43.6	17.3	0.6	2.6	118	J. S. Knight, M.D.
Rotherham	31,631	103	29	*	*	*	*	*	*	5	—	—	—	—	2	1	2	*	*	*	3	38.3	10.8	1.9	*	—	J. Hardwicke.
South Shields	61,000	138	84	22	24	6	4	20	8	15	—	1	4	2	4	1	3	14	8	—	6	26.6	16.2	2.9	2.7	159	J. Spear.
Stalybridge	23,124	62	39	9	4	3	4	12	7	6	—	3	1	—	—	1	1	13	6	—	—	31.6	19.9	3.1	6.6	145	F. J. Roberts-Dudley
Swansea	65,000	174	112	18	15	13	16	37	3	33	—	—	1	1	—	30	1	16	8	2	9	31.5	20.3	6.0	2.9	103	E. Davies.
Teignmouth	7,000	9	5	—	—	1	—	2	2	—	—	—	—	—	—	—	—	2	—	—	—	15.1	8.4	0.0	3.4	—	W. C. Lake, M.D.
Torquay	25,000	*	20	4	—	—	2	8	6	1	—	—	—	—	1	—	—	2	5	1	1	*	9.4	0.5	0.9	*	P. Q. Karkeek.
Toxteth Park	8,000	24	7	—	—	1	1	2	3	1	—	—	—	—	—	1	—	2	—	—	—	35.3	10.3	1.5	2.9	—	R. W. Pendleton.
Warrington	37,000	159	59	10	14	3	5	13	14	9	—	—	1	1	4	2	1	8	4	3	5	50.6	18.8	2.9	2.5	63	G. W. Joseph.
Wednesbury	26,000	106	34	12	10	1	1	3	6	9	—	3	—	—	1	3	2	5	2	1	—	48.0	15.4	4.1	2.3	113	J. C. Garman.
West Derby	32,263	87	37	4	9	4	—	15	5	8	—	—	5	—	1	—	3	1	3	—	—	31.7	13.5	2.9	0.4	46	W. Carter, M.B.
Withington	15,000	47	14	2	2	3	1	2	4	—	—	—	—	—	—	—	—	1	—	3	2	36.9	11.0	0.0	0.8	43	T. C. Railton, M.B.
Worthing	9,365	*	11	—	—	—	2	4	5	—	—	—	—	—	—	—	—	1	3	—	—	*	13.8	0.0	1.3	—	C. Kelly, M.D.
York	46,436	156	62	13	7	1	5	20	16	4	—	—	3	—	—	—	1	6	9	1	4	39.6	15.7	1.0	1.5	83	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

measuring the rate of infant mortality. The annual death-rate in the 55 sanitary districts averaged only 15.1 per 1,000, was 3.3 below the average rate in the twenty larger English towns, and was somewhat below the estimated rate of mortality in the whole of England and Wales. Only in four of these 55 sanitary districts did the annual rate of mortality in August exceed 20 per 1,000; it was 21.2 in Barnsley, 20.9 in Derby, 20.9 in Kidderminster, and 20.3 in Swansea. The rate was lower than 10 per thousand in Devonport, Littlehampton, Teignmouth, and Torquay. Monthly rates of mortality, however, in comparatively small populations, should be used with caution, although the fact that few or many deaths have been referred to the principal zymotic diseases during any given month is as important, from a public and local point of view, with reference to small as to large sanitary districts.

To the seven principal zymotic diseases 310 deaths were referred in the fifty-five districts for which we publish statistics, and were equal to an annual rate of only 2.1 per 1,000, while the zymotic rate in the twenty largest towns averaged 3.8 per 1,000. No death from small-pox occurred in any of these fifty-five towns. Measles, however, showed fatal prevalence in Kidderminster; and the fatal cases of scarlet fever were proportionally numerous in Derby, Halifax, and Oldham. Fever, probably enteric, caused thirty deaths in Swansea. The highest recorded death-rates from these seven diseases occurred in Kidderminster, Redditch, Swansea, and Wednesbury. The fatality of diarrhœa, which was equal to 1.7 per 1,000 in the twenty largest towns, was remarkably small in the fifty-five smaller towns, where it did not average more than 0.7 per 1000.

Diseases of the respiratory organs caused 313 deaths in these fifty-five sanitary districts, equal to an annual rate of 2.2 per 1,000, which nearly corresponded with the rate from the same diseases in London, where it was equal to 2.3 per 1,000. These monthly statistics will afford valuable assistance in studying the local and seasonal fatality of this class of diseases.

The rate of infant mortality, measured by the proportion of deaths under one year to births registered, averaged 112 in the fifty-five sanitary districts, against 150 in the twenty largest towns. A month is too short a period for useful comparison of the infant rates of mortality in these fifty-five towns, although the average rate in the aggregate population of these towns may be accepted as trustworthy for comparative purposes. It may be noted, however, that the proportion of infant mortality in Batley, Boston, and Redditch, showed a considerable excess during August.

The Society of Arts have now published, *in extenso*, the papers and discussions of the Annual Conference on National Water Supply, Sewage, and Health, held on the 15th and 16th May 1879. The proceedings form an interesting volume of more than two hundred pages.

During the second quarter of this year, the death-rate of Hastings was rather higher than the rate for corresponding quarters of former years; bronchitis, pneumonia, aud pleurisy having been more than usually fatal. No less than 42 out of a total of 192 deaths were those of visitors. The figures at Hove were much more satisfactory. The death-rate was 13.1 per 1,000 (as against 19.2 at Hastings), and not a single death occurred from any of the seven principal zymotic diseases.

SPECIAL REPORTS.

MEETING OF THE BRITISH MEDICAL ASSOCIATION AT CORK.

PUBLIC MEDICINE SECTION.

AT the opening meeting on August 6, Dr. Grimshaw, President of the section, occupied the chair.

Dr. Pacchiotti, of Turin, informed the meeting that the International Congress of Hygiene would be held in Turin in April next, and gave a very warm invitation to the members of the British Medical Association to come to Italy on the occasion.

The subject for discussion by the section was then opened—'The influence of drinking-water in originating or propagating enteric fever, diarrhœa, diphtheria, and scarlatina.'

Dr. Andrew Fergus, of Glasgow, opened the discussion. In his observations, he confined himself almost entirely to cases of which he had personal experience. He said that until lately the city of Glasgow was supplied with river water which contained the drainage of several other towns higher up upon the river. In 1848 cholera prevailed universally in Glasgow. No district was specially exempt from the disease. In 1854 the south side of the city, inhabited by the working population or the lower middle class, had got a supply of pure gravitation water, and when cholera again broke out in Glasgow in that year it was remarked that the inhabitants of the south side suffered very little from the disease, although great numbers of them worked at the north side of the city, where cholera was rife. There was no registration at that time, therefore they could not bring the matter to the touchstone of figures, but the experience of all medical men at the time was, though there was not complete exemption, there was a very marked exemption from the disease in the south side, which had the supply of pure water. In the year 1866 all Glasgow was supplied with pure water, and though since then they had imported cases of cholera, though the poison was there it did not take any hold on the city whatever. There was also a marked diminution in the prevalence of cases of diptheria since Glasgow got a supply of pure water. He remembered once going to a fine house in a beautiful part of the country in Lanarkshire, and three members of the family were down with typhoid fever, and on investigating the case he found that the cause of the outbreak of the disease was an impure well from which the house was supplied with water. In another instance he had been told by a lady that her family had never been really well since they removed to a large house, and on enquiry it turned out that there was a cesspool with an open grating within a short distance of the well which supplied the house with water. The same thing occurred in cases of diphtheria, and he (Dr. Fergus) had found many cases which were clearly traceable to impure water. On the return of several families to Glasgow from a watering place, which had been called the Brighton of Scotland, many of the members of those families were suffering from typhoid fever, and an examination of the wells in the vicinity of the place being made, it was discovered that every one of the 28 wells showed evidence of organic pollution. He (Dr. Fergus) applied the only test he could, the Nessler solution. He would counsel people to have the water attached to a house always tested before taking the house, and if the water was at all sus-

pected let it be distilled. Water contaminated by sewerage was not unpleasant to drink, for this reason —that the organic matter decomposed, and the process of decomposition produced chemical actions, which rendered the water sparkling and cooling, and almost pleasant to the palate, much more so than wholesome water. Not alone should all communities be supplied with pure water, but all sources of impure water should be cut off. Dr. Fergus concluded by saying that in some cases it was hard to overcome the partiality they had for old practices, and, as an instance, mentioned how in a case of a favourite well in Glasgow—the closing up of which would have caused a general outcry, because the people were in the habit of walking out to it every morning and having a drink of it—the authorities got over the difficulty by turning the pure Loch Katrine water into the well, and the people went and drank out of the well as before, not knowing the difference.

Dr. Alfred Carpenter, of Croydon, then read a paper on 'The dual requirements necessary for the production of enteric fever, and the fallacies which are based on a narrow view of the germ theory'. He said that some writers assumed that if an enteric germ found admission into a pure water supply it retained its vitality. He pointed out the fallacies contained in this assumption, as also in the beliefs which were often expressed, that there was no limit to the distance which the contagion might not be transmitted underground. He also believed that filtration would not alter the contagious nature of particles, and also that neither microscopical nor chemical analyses were able to prove the absence of such contagious particles. Those fallacies had been propagated in districts supplied with water from deep wells. It had been stated that zymotic diseases of every kind which had arisen in those districts had been caused by water alone, independently of importation, contagion, or local nuisances. The fallacies were used for the purpose of assailing the character of deep-well water, and for resisting the establishment of waterworks, which were often urgently required. It was argued by the authors of the fallacies in question that water which might have been polluted by mischance or accident was not fit for public supply, because they said there were no safe provisions in nature for restoring it to a state fit to drink. Dr. Carpenter brought forth evidence based upon experience, as well as the observation of others, to show that such ideas were dangerous fallacies. He also pointed out that two causes were generally at work in the establishment of an epidemic of enteric fever. First, there was a marked departure from the first sanitary law, by means of which the house of the victim was exposed to sewer contamination from defective sewers; and, secondly, that the water sewers were in immediate communication with the sewer system, by means of which an interchange of material took place, and thus typhoid germs gained admission. He was of opinion that germs of typhoid would abort or fail to set up irritative fever, if the constitution in which they are planted has not been reduced in power by exposure to sewer decompositions or to repeated doses of morbid matter. He showed that there were conditions in the nature of things which tended to purify streams underground, as well as atmospheric air. The sum of his conclusion was that an occasional germ might be in water, but if that water was pure it could not multiply there; whilst if the body of the recipient was healthy, and had not been exposed to miasma from decomposing animal matter—such as escape from common sewers, it would abort, and no fever be likely to arise.

Dr. J. Lane Notter then read a paper on the value of chemical and microscopic analyses in relation to the question treated of by Dr. Fergus and Dr. Carpenter, which is published *in extenso* at page 87.

Dr. Norman Kerr enumerated numerous cases of enteric fever which he said were selected from a large number where contaminated water seemed to be the originating cause of enteric fever, diarrhœa, diphtheria, or scarlatina. He said that he had seen in one family at the same time one member struck down by scarlatina, a second by diphtheria, a third by diarrhœa, a fourth and a fifth by slight sore throat, and a sixth by erysipelas. In more than one instance of this kind the varied diseased conditions were all traced to the impure drinking water. Dr. Kerr wished it to be understood that in these remarks he referred only to the apparent *origination* of diseases. He continued: 'Instances of *propagation* through water infected with excretions from previous cases of disease are continually confronting me. I have long been driven to the conclusion that the same contaminated drinking water may, without the presence of specific germs, give rise to different diseases, the poison making itself manifest in the shape of erysipelas, scarlatina, diphtheria, diarrhœa, or enteric fever. The source is the same, the poison is the same, but the physical state of the individual constitution, or some idiosyncracy of susceptibility, or some differential surrounding condition, is the factor in determining the special form of ailment the poison may assume in any particular case.'

A paper from Dr. Ballard was read by Dr. Martin. The paper commenced with a formulation of the writer's belief in the ancestral origin of the contagium of enteric fever as it is now met with, and, after quoting some remarks upon the subject by his colleague, Dr. George Buchanan, and paying tribute to the memory of Dr. John Snow as the father of the doctrine of the spread of bowel contagia through the agency of drinking water, proceeded to narrate briefly some of the experiences of his colleagues in the Medical Department of the Local Government Board, and of himself in relation to this mode of spread of enteric fever. The main object of the writer was to demonstrate the great difficulty which sometimes attends the attempt to trace the ancestry of the contagium, and the necessity of untiring patience on the part of the investigator. The outbreaks of fever which he refers to are the following, viz.: 1. The recent outbreak of fever at Caterham and its neighbourhood, which was investigated by Dr. Thorne Thorne, and which was ultimately traced to the dropping of portions of infected dejections proceeding from a labourer employed while ill with the disease, into a well from which the Caterham Water Company drew part of their supply—the well being at the time under repair. 2. The outbreak of fever among the students of one particular and new wing of Caius College, Cambridge, which outbreak was investigated by Dr. George Buchanan. This outbreak was traced to the admission of sewer-air from a particular sewer into a local service which was presumably constant, yet which was discovered on particular days to have been intermitted. There were defects discovered in the water-closet arrangements which facilitated the occurrence of the accident. The sewer in question was found on inquiry to have received enteric fever dejection. The other cases narrated were out-

breaks of fever which were investigated by Dr. Ballard himself, viz.: 3. An outbreak at the village of Nunney, near Frome, due to the use of the water from a foul brook, which water, however, did not occasion fever until a case of fever imported from a distance occurred on the summit of a gorge through which the stream flowed above the village. The infected dejecta were deposited at the edge of the gorge, and the outbreak in the village occurred ten days or a fortnight after rain such as would have washed some of them into the water. 4. A somewhat similar occurrence in the village of Hawkesbury Upton, in Gloucestershire; but here it was the case of water from the wells sunk side by side with privy cesspools in a fissured oölite rock, and thus habitually polluted, which was the means of spreading the fever. The first case imported from a distance occurred in a cottage at the upper end of the village, near the top of the slope on which the village stands; the infected evacuation thrown into the privy first infected the neighbouring well, and the infection spread from the well through human systems to cesspools, and from cesspools again to wells, down the village, and even into isolated country places, through children attending school and drinking water there. 5. An outbreak occurring in an isolated row of five cottages in the country near Birmingham; it was traced to the use of the water of a well at the rear of the cottages across the corner of which passed a drain which carried slop waters away from the cottages. No fever occurred until a laundress, occupying one of these cottages, washed there some linen soiled with the evacuation of a girl who was at that time ill with enteric fever at Moseley, one of the suburbs of Birmingham, and whom Dr. Ballard had himself seen in the course of an inquiry into an outbreak of fever in Moseley, which was due to infected milk. 6. Lastly, Dr. Ballard narrated briefly the conditions he found present at a dairy farm at Ascot, at which place and neighbourhood enteric fever, which he demonstrated clearly to have been spread by infected milk from the farm, continued to prevail epidemically for four years and a half. The fever was introduced into Ascot by some cases which formed part of the notorious milk epidemic at Marylebone in 1873. The evacuations from one of these cases were thrown into a hole in the sand (lower Bagshot sand) at the top of the hill. The suggestion made by Dr. Ballard, upon which he invited discussion, was that the infective material, washed down by the rain through the sand into the water layer below, might have been carried in that water by its movement naturally in the direction of the dairy farm, and actually drawn with water from the well at the farm, at the distance of about half a mile. To such as may feel startled by so bold a hypothesis, he suggested the consideration of the serious outbreak of fever at Lausen, in Switzerland, described by Dr. Frankland, where the contagium, originating in a valley, was carried in water through a mountain (and, as Dr. Frankland believes, filtered in its course) a distance of a mile, and infected the drinking water in another valley on the opposite side of the mountain.

Surgeon-General Crawford, Dublin, said that, coinciding as he did with regard to the remarks made as to the importance of a pure water supply, and as to the great factor impure water was in promoting the diseases referred to, still he found from experience that more than once several forms of fever, typhoid, diphtheritic, and others, had arisen from other causes than impure water. After five years recently spent in India he had made that discovery, and he did not mention it with a view of contradicting what the gentlemen who read the papers had put forward, but for the purpose of inducing them and others to follow further the source of those diseases, holding as he did that impure water alone would not account for the spread of contagion in all cases. He remembered an instance of a cavalry regiment which, during its service in India, had been visited with three different outbreaks of typhoid fever. That regiment had recently returned to this country—the 11th Hussars. After being three years in the country, the regiment was attacked with typhoid when at a station called Morar. Having removed from this, typhoid again broke out in the regiment, and when the 11th Hussars came to Umballa a third attack of typhoid visited them. He (the speaker) was only with the regiment at Umballa, but he took counsel with the medical officers who had been in attendance on the troops at the first two stations, and they could come to no other conclusion than that (whatever the cause of the typhoid outbreak might be) it could not be traced to contamination of the water by sewerage in any of the three localities. They were all well marked cases of typhoid, but, as he said before, it was impossible for the outbreak to be traced to impure water. He believed that such diseases could be ascribed to some other cause, that they were conveyed to individuals by other means than water; and he thought the fact should be borne in mind, in order that investigation should be made to determine from causes other than sewage contamination, diphtheria or typhoid fever might arise.

Mr. Vacher, of Birkenhead, said he held that examination of water by the microscope was a matter of even more importance than chemical analysis, as he believed the chemists had had their own way too long in this matter, and the morphological impurities could undoubtedly be better determined by the microscopical examination than by the chemical. Furthermore, he thought the morphological impurities in the air should be determined and set out, instead of taking the carbonic acid and the other impurities in it.

Dr. Littlejohn, Medical Officer of Health for Edinburgh, concurred with the opinions expressed by the last speaker, and mentioned that in the new and well sewered part of the town of Edinburgh they found fever cases, while there were none in the other part, where they had poverty and disease to any amount. He was of opinion the microscope would be found of importance in tracing the causes of disease.

Dr. Fergus then said that he wished to make a few observations in reference to the remarks of Surgeon-General Crawford, who had raised a very important point. He (Dr. Fergus) and the other gentlemen who had spoken did not for a moment wish to indicate that those diseases did not arise from other sources of impurity than water. But he (Dr. Fergus) held, however, that the diseases under discussion arose almost invariably—he might say invariably—by taking into the system by air or by water human excrement in a state of decomposition. The question was how those noxious gases were conveyed into houses so as to cause an outbreak of fever. It got in in several ways. The general opinion was that it was by tension of the sewers, or by suction power of the openings into the drains, that it was conveyed into the houses, and he (Dr. Fergus) was extremely puzzled for a long time as to how that air got into houses. What led him to find it out was

observing the decay in leaden pipes in houses. The exterior of the pipes only became decayed, while the inside of them, through which the water was carried, showed no signs of decay. His opinion was that one of the means by which those gases got into a house was this—when they could not escape through the water-closet under the ordinary sanitary arrangements, they were driven back through the supply pipes into the cistern, which in many cases supplied the house with water for dietetic purposes, and hence the cause of the outbreak of typhoid fever in many cases where it was rather difficult to trace it.

The President said the question upon which Dr. Fergus had spoken was a very important one. As far as his (the President's) experience went, he knew two cases of typhoid fever which were caused by the noxious gases being absorbed into exposed cisterns after passing through pipes, thereby becoming drinking water for the house. He remembered on one occasion attending six members of one family with typhoid fever, and the only cause that could be traced as leading to that outbreak was the contamination of the water in the way that Dr. Fergus suggested. In Dublin they were supplied with the same sort of water, they were informed, as was supplied in Glasgow, as regarded its chemical constituents; yet typhoid fever was steadily on the increase in Dublin. That in all probability would point to the fact that typhoid fever owed its origin to some other cause than the supply of impure water alone. There was only one other matter which he would like to have heard a word about, and that was as to the properties of hard and soft water in carrying disease. Many believed that soft water was dangerous from the facility with which it took up the diseased particles caused by decomposition, and that hard water was free from all that danger. A great deal might have been said on this question, and he was sorry that it had not entered into the discussion more than it had done.

On August 9th, Dr. Grimshaw, the President of the Public Health Section, delivered an address on 'The Public Work of the British Medical Association', in the course of which he reviewed the work undertaken by this section since its establishment at Oxford in 1868, under the presidency of Mr. J. Simon.

Dr. John W. Moore, Dublin, opened the discussion on the subject of 'How are we to deal, by isolation or otherwise, with convalescents from acute infective diseases, so as to limit the spread of disease?' He said that, from his experience, he had come to the conclusion that the only way to limit the spread of contagious disease was by a complete system of isolation between the sick and convalescent, and he used the term 'isolation' in its most extended sense. The convalescent must be kept separate until the days of his purification were accomplished, and in the words of the old Mosaic law, he might say of the convalescent patient:—'He shall dwell alone; without the camp shall his habitation be.' Nor would it suffice to isolate the convalescent himself—his wearing apparel and other possible *fomites* must also be prevented from doing harm by thorough disinfection. Sometimes, indeed, nothing short of destruction by fire could neutralise the danger. In the twelve months ending March 31, 1879, upwards of 1,500 small-pox patients passed under his observation in the epidemic wards of the Cork Street Fever Hospital. Often and often was he an eye-witness of the untoward effects of a prolonged sojourn in the necessarily tainted air of the hospital. Abscesses, bed-sores, diarrhœa, pleurisy, and other diseases were sequels of the disease in too many instances, and he could not help thinking how different it might have been had the sufferers been removed in good time to a purer air. The surroundings in even the best managed epidemic hospital could not fail to exercise a depressing influence on the minds of patients who are recovering from illness. It should not be forgotten, also, that beds were being occupied by the convalescent, which might probably be urgently required at the very moment for the patients in the earlier stages. At present he believed that in Ireland neither suitable nor adequate places existed for either hospital or private patients recovering from infectious diseases. Dr. Moore exhibited a plan of a convalescent home, and recommended that it should be in a rural position, about a mile away from the city, and situated in a plot of from 10 to 12 acres. And with regard to private patients, he suggested that convalescent homes should be built and regulated on the plan of private lunatic asylums.

Mr. Francis Vacher, Birkenhead, advocated the establishment of convalescent hospitals, if feasible, in the way Dr. Moore suggested; but the difficulty was the want of money. In the present circumstances he would keep the patients in hospital until perfectly free from infection, and for that purpose he would set some special wards apart. He believed that the Government would be constrained to take action in this matter, because it was as much a matter of necessity to abridge the liberty of the convalescent patient (until thoroughly recovered) as it was to deprive of liberty any other person whose presence was calculated to be an injury to society.

Dr. Notter, in the absence of Dr. Ransome, read a portion of the latter gentleman's paper. He did not go in for quarantine in cases of convalescent patients, but he recognised the importance of pure water and good drainage in the case of typhoid fever. He considered that diphtheria was only slightly infectious, and that complete isolation should be resorted to in cases of scarlet fever only. He was not in favour of building large convalescent hospitals for infectious diseases, as in his opinion small hospitals with well-ventilated wooden walls were the best kind of building to be used for such a purpose. In private cases Dr. Ransome advocated Dr. Budd's plan, which was simply anointing the body with some camphorated or olive oil.

Dr. Pacchiotti, Turin, said that the view of procuring convalescent hospitals was one that would shortly receive practical realisation in every country in the world, because there was nothing more urgent. He did not agree with Dr. Ransome's view that scarlet fever was the only infectious disease, because measles were infectious, so were typhoid fever, scarlatina, and even diphtheria.

Dr. Stewart said that thirty years ago he felt that the great desideratum was a convalescent home for patients suffering from infectious diseases, and even chronic diseases, in order to effect the speedy restoration to health of the patients. In order to erect those buildings he thought application should be made to the Government for loans, and they should be under the Poor Law authorities, who could appropriate portion of the rates to their support, or strike a special rate for the purpose.

Dr. Darby, of Bray, suggested that as there were some difficulties in the way of convalescent homes, a committee of the association should be appointed

to consider the whole subject, and define at what period of convalescence they would consider a patient free from infection. He pointed out the difficulty of inducing a noble lady to send her child, who may have been affected with infectious disease, to a convalescent home, or a noble lord sending his wife there, but as to the question of expense, he thought that difficulty could be easily got over.

Mr. Vacher said he had recently visited the Fever Hospital in Cork, and he found that out of 44 beds for acute patients, 27 beds (in a different room) were set apart for convalescents, and he thought that a very good arrangement.

On August 8, Dr. M'Call Anderson, in the unavoidable absence of Dr. Andrew Fergus, read Dr. Fergus's address on 'Preventative or State Medicine'. Dr. Fergus, in his address, said that until a comparatively recent date, the public mind, both professional and lay, seemed thoroughly impressed with the idea that the whole function of medical men began and ended with the treatment and, if possible, the cure of the sick. This led to a two-fold evil; it first produced too strong a belief in drugs, and tended to make the profession degenerate into a mere trade, the success of which greatly depended on the quantity of drugs the unfortunate patient could be got to swallow. The second evil was the neglect which it occasioned of all preventive medicine. It was now dawning on the present age that medical science could possibly do a little more; and that, in addition to the treatment of disease, something might be done towards its prevention. Thus, what was supposed to be a new department of medical science sprang up; but Dr. Fergus held that State medicine as a very important branch of the profession was not new, as under the old Mosaic law the medical officer of health was endowed with absolute authority to separate the sick from the healthy, and also to isolate infected persons so completely as to prevent the disease from spreading further. Dr. Fergus then instanced many old laws of various countries (strict and severe laws) regarding the treatment of persons affected with leprosy, and said it was an interesting question how all regulations as to preventative measures were allowed to lapse and not applied to other diseases, such as small-pox, the most obvious as well as the most repelling of zymotics. Up to 1851 not a single death from diphtheria was registered, and in that year the deaths were two per million. It did not spread rapidly, for in 1857 there were only 16 deaths per million. It then rose very suddenly, and reached its maximum in 1859, when there were as many as 487 deaths per million of the population. Since then it has fluctuated greatly, but has only once been under one hundred deaths per annum for every million of the population. Owing to the great good sanitarians had effected of late years the deaths from fever had decreased, and especially typhus fever, and Dr. Fergus attributed this diminution to better house accommodation, and the supervision of medical officers of health. Contrasting water-closets and earth-closets, of the latter of which Dr. Fergus is an advocate, he says in conclusion:—'Another point I had to consider was the behaviour, if we may so term it, of water and excremental matter. It is a popular opinion that water is a purifier, but in regard to these matters it is a mere shunter. It merely removes the nuisance from my door to deposit it somewhere else; it conveys organic refuse, but does not destroy it; it merely carries the nuisance from the city to make it a source of pollution in the river. Chemical science tells us that water of itself and by itself has no purifying power; if you could shut up pure water and pure filth (if we may use such a term), they would remain the same for all time, the only purifying element in the water being the small modicum of air dissolved in it. In a shallow brawling stream, this exercises a considerable power, as the water is constantly being re-ærated, but very slight in a deep sluggish stream, and hence the ready pollution of our rivers by organic refuse. I hope I shall not be misunderstood and considered as in any way defending the abounding abominations of the old privy system, when I say that the change to water-carriage was adopted without sufficient investigation, and with no adequate conception of the results which would follow. The system was hailed as a great boon both to comfort and decency, and it was at that time supposed that if these offensive matters were once out of sight there was an end of them, and no evil consequences were dreaded. But another most cogent reason against passing these offensive matters into our rivers or the sea, is the consideration that such a course is directly opposed to the laws of nature, in the economy of which there is no such thing as waste. Earth is the original mother of all organised matter, and her law of rotation seems to be, first, plants, from which animals draw their support. What is given off from animals should be restored to the earth again. We know that the carbonic acid so freely given off by animals is at once utilised for the growth of plants; but I believe if it had been left to our own disposal, the whole world would have been asphyxiated long ago. The other excretions of animals are equally necessary for the growth of the vegetable world. After years of further study and investigation, I can only adhere to my opinion expressed many years ago, that 'if it is true that organic poisons producing disease may pass from sewage; if it is true that cholera, diphtheria, typhoid fever, and diarrhœa are traceable to taking into our systems by air or water the results of decomposition of human excreta; if it is true that these diseases, and others from the same causes, swell our death-rate and carry off some of the most valuable of our population, then, gentlemen, I affirm that the only true sanitary solution of our difficulties is, that all excreta shall either be returned to the earth or subjected to chemical action, rendering decomposition impossible; and I am furthermore sure that if a tithe of the skill, ingenuity, and one-thousandth part of the money that have been devoted to water-carriage had been spent in investigations in this direction, the problem of the sewage question would have been solved long ago.'

Surgeon.-Gen. Crawford said, with regard to the suggestion that earth should be substituted for water, he entirely agreed with Dr. Fergus, but in the efforts which had been made, and were still being made, to carry out that suggestion, he feared that the principle involved was likely to be endangered from the desire which had entered into the minds of engineers in this country to devise complicated machines to act as closets. He hoped the sanitarians of the country would see their way to advise the public to apply this remedy in a simple and easy manner, and not encourage the use of a mechanical apparatus, the working of which was destructive of the principle they wished to carry out.

Dr. Henry Tweedy, Dublin, read a paper on 'The Causes of Death in Ireland as compared with England.' Having enumerated the various causes of death in both countries—such as zymotic, con-

stitutional, local, and developmental diseases—he proceeded to give the result of a comparison between the Irish and English death-rates from various causes, and showed that the excessive death-rate in Ireland was due to constitutional and not to zymotic diseases. He proved also that consumption was one of the principal causes of death, and this was in a measure due to defective sanitation in various forms, such as impure air, overcrowding, bad drainage, insufficient food and clothing. In conclusion, he alluded to the measures at present being adopted by the Dublin Sanitary Association and other bodies towards the amelioration of this evil in Irish towns.

Dr. Chapman, of Dublin, read a paper on the sanitary arrangements of dwelling-houses, which was chiefly devoted to the means of preventing the escape of sewer-gas into houses.

Dr. J. Lane Notter read an abstract of a paper written by Dr. Bonnafont, of Paris, entitled, 'Reflections on a general scheme for improving the sanitary condition of unhealthy countries, having in view the prevalence of epidemics, the production of the soil, the health and prosperity of the populations.' The object of the paper is to improve the sanitary condition of those countries in which are produced toxic elements which at certain definite periods decimate the populations, and the soil is left unproductive. All the means employed up till now applied only to man in health, whereas prophylactic measures are almost entirely neglected. We certainly cannot prevent the action of influences inherent to the different climates; but what we can do is to instruct the people to protect themselves against those influences, as history teaches that it is precisely those who are the least civilised, and consequently those who leave the soil uncultivated, who are most exposed to epidemic influences. It must be admitted that the various Governments have adopted certain prophylactic measures for the protection of their subjects; but what is wanted is the co-operation of the Governments of the different countries to prevent the spread of epidemics. The subject should form part of the diplomacy of the Governments, which should have a Minister of Public Health—an office much more important than the Minister of War—the one being destined to protect human life, whereas the other was to destroy it. There should be an international arrangement between the different Governments, not only with the view of adopting local sanitary measures for the suppression of epidemic influences, but to prevent their spreading to other countries. The means proposed for the accomplishment of these objects consist in drying up the inundated soil by thorough drainage; or where the inundation is continual, or where the land is below sea level, the water should be dammed up, and in the case of rivers, it should not be allowed to flow into the sea—as, for instance, the mouth of the Ganges, the source of that most deadly malady, the cholera. Cultivation of the soil is another important measure that should be adopted, and the earth should not be turned up before it is thoroughly saturated by the rain.

Dr. Notter said he had a resolution to put before them, which it was determined to send forward from this section to the general meeting of the British Medical Association. It was as follows:—'Resolved,—That this section is of opinion that a committee of the Association should be appointed to see how we are to deal, by isolation or otherwise, with convalescents from acute infectious disease, so as to prevent its spread.'

Dr. Littlejohn seconded the resolution, which was adopted.

The business of the section was concluded with an unanimous vote of thanks to the President, Dr. Grimshaw.

THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE TEMPERATURE OF TOWN WATER-SUPPLY, ETC.

AT the recent meeting of this Association, Mr. Baldwin Latham read a paper on the above subject, and pointed out that any increase in the temperature beyond 55° rendered water very unwholesome. He drew attention to the fact that the temperature of the water-supply of a town as furnished by public waterworks was totally independent of the temperature of the water at its source of supply, and that invariably the temperature of the water was the temperature of the ground at any season of the year at the depth at which the distributing mains were laid. While the temperature in the chalk wells at Croydon gave an average monthly range, based upon daily observations, of 0.64°, the same water when supplied direct from the mains gave an average monthly range of 21.14°, or when stored in a cistern a range of 28.05°; while water supplied from the Thames in Westminster gave an average monthly range of 24.69°. But the average yearly difference of temperature between the chalk water supplied at Croydon and the Thames water supplied in Westminster was only 0.67°.

Mr. J. Oldham asked whether Mr. Latham could tell the various temperatures in artesian wells from 1,400 ft. to 1,800 ft. Mr. Latham said that he had made a very large number of observations, and he found that the temperature of the overflowing wells at Wandsworth was about 52½°. The temperature of the water in wells varied very greatly. In some of the deepest wells the temperature was colder than in the shallow wells. The movement of the water through the strata of itself increased the temperature. Diarrhœa was most largely produced when the water-supply became heated beyond a certain degree. Until the water delivered in a town reached something over 60° of constant temperature, diarrhœa did not break out in that town. During this summer the temperature of the water had been 5° less, and the result was that diarrhœa had prevailed only in a very slight degree. The temperature of the water was, from a sanitary point of view, extremely important, and one which ought to be more fully investigated in regard to its influence upon certain classes of disease.

Mr. J. W. L. Glashier said that, having long been connected with the Registrar-General's Office, he had frequently had to take the temperature of the Thames water. It had long been recognised as a fact that cholera or diarrhœa never showed itself to any great extent until the Thames water reached 62°. It stood to reason that when the water pipes were of small diameter and were near the surface, the water partook of the temperature of the surroundings. He was in favour of having a much larger diameter of supply pipes. Water at a depth of 50 ft. or 60 ft. differed very little from the climate, but at a depth of several hundred feet the temperature was higher. Captain Galton said that the water-pipes should as much as possible be kept below the ground. The statements which had been made were a strong argument in favour of the abolition of cisterns and in favour of a standing water-supply.

In the Chemical Section, Professor Dewar in the chair, Mr. W. H. Watson read a paper 'On the Detection of Milk Adulteration'. From analyses of milk from various dairies, and by a comparison of the results obtained, with the circumstances existing as to the character and quantity of the food, the nature of different cows, their condition and their health at particular periods, and the changes of the seasons of the year, he drew the conclusion that cows' milk is subject to considerable variations in composition. He found, in many instances, milk from well-fed, healthy cows to contain as little as 10.5 per cent. of total solids, and from 8.5 to 9 per cent. of solids not fat. He compared the results of other experimenters, and then suggested that the present limits adopted by public analysts for genuine milk should be reconsidered.

Professor Wanklyn said that since the Adulteration Act had been put in force several thousand milk dealers throughout the country had been fined on the faith of the standard, and if the standards were not reliable many of those persons had mainly to thank him for having been unjustly fined. He had always had the courage to rely on chemical work, whether done by himself or others, when it had been submitted to full discussion, and he took upon himself the responsibility to advise, and, to some extent, force, the adoption of the standard, but he should not take upon himself the responsibility of stopping discussion. If any one had anything to say against the standards, he should always endeavour to secure him a fair hearing. Objection had been taken to his statement that milk is wonderfully regular in its composition. His reply to the objection was, that though the milk was in some respects variable, yet if they looked carefully at its composition they would find great regularity in it. If they were to take all the milk in England to-morrow and analyse it, the 'solids not fat' would be found to be 9 per cent. The total solids in milk were not as constant as the solids not fat. He (Professor Wanklyn) had made weekly examinations of milk for the last eight or nine years, and had probably examined a greater quantity of milk than any other person, the reason being that the method he had introduced had become so very rapid that it was possible for a single individual to make an immense number of experiments. The practice he followed, and which he believed was generally followed, was to refrain from advising a prosecution unless something like 10 per cent. of water should be found. In analysing milk the mean standard should be taken, because if they took a low standard they would be licensing all the milk dealers in the country to adulterate their milk. He should, therefore, advise analysts always to take the mean standard, and, as a rule, not to recommend action unless 10 per cent. of water was shown, but to reserve to themselves the right to recommend prosecutions for less should the nature of the case require it.

Mr. Allen said he had a larger district under his charge than any other analyst in England, and he could endorse word for word all that Professor Wanklyn had said. If a man sold bad milk, whether natural or artificial, there was *primâ facie* evidence to condemn him. The standard should be that of average milk, and a prosecution should not be recommended unless the milk fell decidedly below the standard. He recommended the enactment of a standard.

Mr. W. Thompson observed that the Adulteration Act had produced more adulteration than previously existed, because before it came into operation a milkman did not know what a chemist's power was, and was therefore afraid to water his milk. Now, however, he knew how far he could go, and he adulterated the milk to that extent, so that the public obtained an article of proportionately low quality.

Professor Williamson said the quality of milk differed very considerably in the cow even in a single day. As long as the present law continued in operation, and the addition of water under any circumstances was an offence, the only way to discover adulteration was to take the sample of milk from the cow and compare it with the milk as sold. An authoritative committee on the subject would, no doubt, be of much service, but it was too late to discuss the matter now.

The President thought they were much indebted to Mr. Watson for bringing the subject forward. The question here was a question of standard, and he thought that already great good had been accomplished by the Adulteration Act. The analysts had, no doubt, been of great use; but the great point of all was to arrive at a satisfactory milk standard.

Mr. Watson, in reply, pointed out that some alteration was essential in order to secure uniformity. He knew of a case in which 17 per cent. of water was discovered by the analyst. The sample which was sent to Somerset House, however, was reported to be poor, but they could not say it contained added water.

In the Section of Economic Science and Vital Statistics, Dr. T. W. Hime (Medical Officer of Health, Sheffield) read a paper on the vital statistics of Sheffield. After describing the topography and geological characteristics of the town, Dr. Hime said, although handsome public buildings are not a prominent feature in the town, still there are few towns in England where the great bulk of the population is as well provided for in the way of domestic architecture. Overcrowding is very rare, cellar dwellings are unknown, and almost every family has an entire house, a most important agent in securing physical as well as moral health. Owing to the impervious clay existing below the subsoil, surface-wells used to be very common; most of them are closed now, and the water-supply is almost exclusively drawn from the water company, which has large reservoirs to the west. They are eleven in number and cover 492¾ acres. The average daily supply is about 17½ gallons per head. High winds are rare, owing to the high escarpments which protect the town on all sides. The population now is estimated to be 297,538, showing an increase of 48,031 since the last census. Some of the sub-districts increase little, or even decline. The density of the population in general in the borough is only 15.1 per acre; but a large part of the area is wild moorland, never built on, while some parts are closely packed. In Sheffield north there are 257 people living on each acre; in Sheffield west, 89; while in Upper Hallam only 0.36. The birth-rate is high; during the period 1870-78 it amounted to 40.7 per 1,000 living, the highest birth-rate, 41.7, among the twenty largest towns in England being found in Salford, the lowest, 30.7, in Plymouth. The males born in the whole borough are slightly in excess of the females, but this is not true of each of the sub-districts. The marriage rate is also high; in 1875 it was 22 per 1,000 living, while the rate for all England was only 16.8; in 1877 it had fallen to 17 per 1,000, the rate for all England being 15.8. Last year the death-rate was 24.8 per 1,000, or four above the rate

in the twenty largest towns (if London be included) during the nine years 1870-78, but there had been a considerable improvement in the mortality of late years. In fact, Birmingham is the only town of equal size which has had as low a death-rate during the past nine years, if London be excluded. Zymotic and local diseases are the most fatal in Sheffield. Among the local diseases, those affecting the lungs are the most fatal, owing to a large extent to the nature of some of the trades of the town. During the ten years 1850-60 diseases of the lungs amounted to 4.24 per 1,000, and during 1862-71 to 4.86 per 1,000. Phthisis or pulmonary consumption, a disease very fatal in Sheffield, is not included in this. During 1851-60, 3.06 per 1,000 fell victims to consumption, a rate which is 0.39 in excess of the average for all England and Wales. The distribution of deaths among the various trades of the town is a subject which is deserving of the greatest attention. The table (compiled by Dr. H.) exhibiting the average age at death during 1862-71, and embracing 10,000 deaths, reveals many startling facts. There is some reason to believe that the mortality among grinders is not so excessive as it was, though it is still very high. According to the table it was, during 1862-71, forty-four years. The presence of silica and iron has been demonstrated in the lungs of persons much exposed to the dust of grinding and stone cutting. Meinel found an excess of from 30 to 50 grains as compared with the lungs of those who were not exposed to the dangers of dust. If hygienists believe that fevers are preventible which are caused by an invisible, unknown agent, surely we should be able to diminish the terrible mortality among stone-cutters and grinders, the cause of which may be seen and felt and tasted as it hangs suspended in the air they breathe for hours every day in earning their bread. Why many workers at trades of entirely different character should have exactly the same average age at death is a problem which is deserving of attention. Why should policemen have such very bad lives, an average of only forty-one years, the same as the bricklayer? Of 107 soldiers who died in Sheffield, the average age at death was only thirty-four, the same as among rollers, though the former are enlisted in the prime of life, are well fed, housed, and clothed, and have easy work, while the latter live under very trying conditions. During the past five years 2,004 persons have been buried in Sheffield without any certificate from a properly qualified medical man as to the cause of death. This is done, no doubt, in accordance with law, but it is undoubtedly a law which calls loudly for amendment. Another great defect in our sanitary legislation is the want of registration of disease. An epidemic has often made considerable progress in the town before the sanitary authority becomes aware of its existence, the first intimation of which may be the return of the death of some victim. The great and laudable energy displayed in getting children into school now-a-days, renders it imperative that the master should be aware where infectious diseases exist, so that the brothers and sisters of children suffering from such disease may be rigidly excluded from school until there is proper certification that they can return without danger to themselves or others. It is a cruel and unjustifiable thing to compel children to come to school, and, as at present, to take no precaution to see that their life or health is not the penalty. Indeed, the schooling arrangements should be in other respects also supervised by proper medical authorities, seeing that a school board has such power for good or evil over the physical health of a large part of the population in the tender years of growth. It is to be hoped that the time is near at hand when hygiene will be a compulsory subject in every school, and that as much time will be devoted to the study of the living body and how to maintain it in health as is given to the study of dead languages and of inert matter. Sickness is the fruitful parent of poverty and crime, and the miseries it entails are worse than war or famine. Its victims are infinitely more numerous; but there is reason for anticipating that the great increase in the value of life and the steady decrease in mortality which have been witnessed even within a comparatively short time will be more marked still in the future as our knowledge and scientific methods of research become perfected.

COMPLETION OF THE SOLIHULL SEWERAGE WORKS.

New sewerage works for the Solihull district have been formally handed over to the Rural Sanitary Authority. The separate system of sewerage has been adopted, and provision made for an ultimate population of about 7,000, the cost of the works, etc., being about £6,000. The effluent water from the tanks is carried off into the Blythe and the Birmingham Canal.

Mr. Pritchard, of Westminster and Warwick, the engineer, gave, at the ceremony, a detailed description of the works and the mode of dealing with the sewage. In July 1878, the works were offered for public competition, and the contract of Messrs. Green and Son, of Warwick, was accepted by the Authority. The system of sewers represented what is commonly called the straight-line system, with man-holes and ventilators at each change of inclination, whether vertical or lateral. It was a sort of separate system, the sewage only being intended to be conveyed to the outfall, and the minimum quantity of surface water. The great principle was to prevent the surface water from the roads, and the rain water from the roofs, from entering. The length of the sewers would be 2,590 lineal yards of 15 inches outfall sewers, and 3,100 yards of 9-inch branch sewers, giving a total of between three and four miles. The depth of the sewers had, in consequence of the superficial configuration of the ground in some instances, been excessive. They had gone as deep as 20 feet. The great difficulty had been to keep out the subsoil water, but in spite of every care something like 140,600 gallons passed through the sewers every twenty-four hours. This was partly attributable to the very wet season. Flushing chambers were constructed to assist in cleansing the mains, each chamber containing about 400 gallons of water, which could be liberated when required. For the purpose of ventilation the system was open, and there was no impediment whatever from sewer gas. The 15-inch sewer had a capacity of 1,145,000 gallons in twenty-four hours, and the 9-inch of nearly a million gallons. It was intended to provide for an ultimate population greater than existed at the present time. The outfall works were constructed on an area consisting of about 15 acres. The Authority had obtained the land on a lease for thirty years, at a rental of £4 per acre, with the power of purchase. The system adopted was a combined system of filtration and irrigation. The sewage was received through tanks, and passed, by upward straining, through a filter medium of gravel. The clarified sewage passed through various parts of the land,

and was distributed by small brick chambers. The sewage sludge was removed by gravitation. In times of frost or excessive rainfall there were four beds provided, representing about three-quarters of an acre, laid out on the principle of intermittent filtration. Mr. Pritchard went on to say that he had been ably supported in carrying out the works by Mr. C. Lewall, C.E., and the manner in which the contractors had carried out the work would bear the fullest investigation. It was proposed to deal with the storm water by clarifying the whole of the sewage, and allowing any excessive quantity of water to pass it at various storm outlets. By the separate system the difficulty of dealing with the storm water was obviated.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF COMMONS.

(*August* 12.)

THE METROPOLITAN WATER-SUPPLY.

Mr. Fawcett called attention to the water-supply of London, and moved a resolution declaring, 'That, in view of the fact that the Metropolitan Board of Works has been unable to pass any measure dealing with it, this House is of opinion that it is a subject which ought, without further delay, to be dealt with by the Government.' In an interesting and exhaustive account of the existing arrangements for obtaining and distributing the water supplies of the metropolis, Mr. Fawcett showed that they were to a great extent objectionable in quality, but that the appliances for distribution, storage, etc., were still more defective. He went also in great detail into the question of expense, showing that, owing to excessive waste and other causes, the supply in London is much more costly than in any other large town. From all this, he contended that it was necessary to go on a new tack, and he expressed his entire concurrence in the conclusion of Mr. Ritchie's Committee that there should be a consolidation of the companies under a central authority to supply the metropolis, not so much for profit as for public advantage. This, he contended, was the only means of obtaining a constant supply at a high pressure.

Mr. Sclater-Booth said the subject was under the consideration of the Government, but no explicit statement must be expected from them now. At the same time, he did not admit that water was dearer in London than in the great towns, and bore testimony to the readiness of the companies to remedy any complaints which he had brought before them.

Mr. Cross said he was quite alive to the evils of the present water-supply, and was not afraid of the difficulties attending the improvement. Without expressing any decided opinion prematurely, he promised, on behalf of the Government, that the subject should be fully looked into in all its bearings before next session, to ascertain whether the water-supply of the metropolis could be improved without any material increase in the cost, and whether it would be necessary to call on the companies to surrender their powers into the hands of some central body appointed by the Government. He hoped, therefore, that Mr. Fawcett would not press his motion, which might tie the hands of the Government and produce other injurious effects, by depreciating the stock of the companies, or raising hopes which could not be realised, or otherwise. But it must be understood by those who dealt in these shares that if the Government undertook any scheme of this kind, no action which the companies might take, no speculative arrangements into which they might enter, no prospective addition which they might make to the value of their shares would be taken into account. The Government would take the shares as they found them—say, at the last day of the last half year.

Mr. Fawcett withdrew his resolution.

MEDICAL OFFICERS' REPORTS.

BIRMINGHAM.—The population of this borough in 1878 was estimated at 383,117; that of Glasgow being 566,940; of Liverpool, 532,681; of Manchester, 360,514; and of Dublin, 314,666. The number of births registered in Birmingham was 15,964, and of deaths, 9,662. The birth-rate was calculated at 41.7; the death-rate, from all causes, at 25.2, and from seven principal zymotic diseases at 6.3 per 1000 inhabitants. The percentage of deaths under one year to total births was 17.0, against 16.4 for London, 19.3 for Liverpool, and 17.5 for Manchester. The mortality from scarlet fever was unusually high, being 25 per cent. of all the zymotic deaths; diarrhœa and whooping-cough also caused a large number of deaths, whilst small-pox is debited with only eight deaths. The disinfecting apparatus was much used in 1878, as 6,976 articles were disinfected at a cost of £209 4s. Dr. Hill says that the public baths have not been so much used as he desires, and points out the necessity for their more common use, and the desirability of a reduction in the charges. Sewerage works have been extended, and 5,992 pan-closets introduced during the year, making a total of 28,660 in the borough; and additional paving of carriage and foot-ways has been laid down. The mortuaries have been fairly used, as 65 bodies were deposited in them during the year. Sanitary work has been pushed on, as 12,377 notices were issued, 3,200 drains were repaired or trapped, 2,000 filthy houses cleansed, 1,190 houses in which zymotic contagious diseases had appeared were disinfected and cleansed, and other works carried out. The lodging-houses, slaughter-houses, etc., were periodically inspected; and 158 samples of food and drink were analysed, milk, as usually, being the article most commonly adulterated.

The report for the quarter ending March 29, 1879, shows lower birth- and death-rates than for the corresponding quarters of 1877 and 1878, although the winter was unusually cold, which is accounted for by Dr. Hill by the diminished mortality from zymotic diseases generally, and especially from whooping-cough. The mortality from bronchitis was unusually large. The birth-rate was equal to 42.4, and the death-rate 26.2 per 1000 population per annum. The sanitary work appears to have been actively carried on, as 2,850 notices to abate nuisances were served during the quarter. There were fifty articles of food examined (a very small number for so large a borough), consisting of 17 of milk, 18 of tea, 9 of mustard, and six of pepper. Six samples of milk and three of mustard were found to be adulterated.

KIRKHAM URBAN DISTRICT.—This is a small district, containing 3,593 persons, amongst whom scarlet fever was unusually prevalent, but being of a mild type, caused only nine deaths. There was also

an epidemic of typhoid, which Mr. Walker thinks might have been produced by disturbance of 'polluted soil' whilst laying a new gas main in the street where the largest number of cases occurred. There were 11 deaths from typhoid, being 10 in excess of the previous year. The birth-rate was 33.6, the death-rate of 27.2 per 1000, which he thinks is less than the true ratio, and does not show a satisfactory state of things in so small a town. The proportion of deaths of infants under one year to total births was high, viz., 15 per cent.

TOTTENHAM.—Dr. W. Watson advocates isolation of cases of enteric fever, as he believes this disease to be both contagious and infectious; baking of infected bedding and clothing, but mentions a lower temperature, 212°, than is usually considered to be sufficient to destroy the morbific principle of scarlet fever, etc. There were only two deaths from small-pox registered in the district. There is no disinfecting oven, which Dr. Watson, as well as ourselves, considers to be an absolute sanitary necessity. He refers to the extreme importance of good and dry foundations for dwelling-houses, of well-made drains, and a proper system of ventilation in newly-built houses. The water-supply is very good. The births were 1,160, and the deaths 590, or nearly two births to one death. The death-rate from all causes is calculated at 17.3, and from zymotic diseases at 2.8 per 1000 population.

WHITECHAPEL. — Mr. Liddle dwells at some length on the advantages of preserving open spaces, and thus preventing density of population; and also gives some cases illustrative of the evils of overcrowding. As regards the former, he cites Dr. Farr's tables of mortality for densely-populated districts, and as to the latter he instances, amongst others, the case of young children kept all day in a small room affording only 28 cubic feet of air for each child. The report under consideration refers to the quarter ending March 29, 1879, and states that the death-rate was about 28 per annum per 1000 population. The number of deaths from zymotic diseases was smaller than usual, but from affections of the respiratory organs was much in excess, owing to the cold weather; and the proportion of deaths amongst infants was 15.2 per cent. of the births.

WIRKSWORTH PART OF BELPER RURAL SANITARY DISTRICT.—This district consists of thirteen parishes, and has an area of 22,808 acres, and a population of 18,210. There were 522 births and 230 deaths registered in 1878, giving a birth-rate of 28.7, and a death-rate of only 12.6 per 1000 population, the mean death-rate for six years being 15.4 per 1000. The zymotic mortality was very small, viz., six only, or 2.6 per cent. of the total deaths, and the proportion of deaths of infants was also low as compared with births, viz., 10.3 per cent., but was large in comparison with total deaths, of which they formed more than 31 per cent. Mr. Gaylor says that the chief cause of the infant mortality is hand-feeding with dirty feeding bottles, so that the milk speedily becomes decomposed, and the frequent use of teething powders. The sewerage of the district is indifferent.

BELPER DISTRICT. — This originally included Wirksworth, from which it is now separated. Mr. Allen gives a detailed account of the sanitary condition of the various parishes included in his district, and estimates the population at 16,580; the death-rate at 15.07, and the birth-rate at 34.7 per 1000 inhabitants. The zymotic death-rate was only 1.2 per 1000, the mortality from whooping-cough and scarlet fever being below the average. In the village of Muggington the death-rate was only 4.1, the mean for six years having been 10.7 per 1000. In the village of Quarndon Mr. Allen found a child in the desquamative stage of scarlet fever, sitting in a room of the post-office, which was appropriated to the reception and sorting of letters, sale of stamps, etc. The office was speedily closed for a time. Sanitary works appear to have been actively carried out.

FYLDE RURAL SANITARY DISTRICT.— Mr. J. Davidson Walker says that during the year 1878 many important new drainage works have been constructed, and the water-supply improved, especially at Layton Hawes, where typhoid fever has always been more or less endemic. The birth-rate was 31.5; the death-rate 18.2; and the zymotic death-rate 3.2 per 1000 population, the latter being in excess of the ordinary mortality, arising from the unusual number of deaths from diarrhœa. The mortality amongst infants was high for a rural district, viz., 24.7 per cent. of the total deaths, and 14.3 per cent. of the total births.

BOLTON.—Mr. Serjeant devotes a large proportion of his report to a consideration of zymotic diseases, giving tables of the different streets in which they occurred, the number of deaths during the past ten years, etc. As regards infantile diarrhœa, he attributes the deaths to high temperature and insanitary influences, and the mortality from typhoid fever chiefly to sanitary defects in the drains. He also epitomises the results of the compulsory notification of infectious diseases. The arrangements are at present incomplete, as there is not any special hospital for these cases. The total number of infectious cases reported was 1,939 out of a population of 105,000 persons. The birth-rate was 37.6, the death-rate 22.0, and the zymotic death-rate 4.7 per 1000, and 21.5 per cent. of the total deaths. There were 2,206 nuisances abated, and 2,215 houses examined. The quality of food sold in the borough is reported as being 'very satisfactory'.

KING'S NORTON RURAL.—There seems to be much room for improvement in the sanitary conditions of this district, although a good deal has already been accomplished. Some six villages have been properly sewered, but there is about an equal number more which still remain to be done, the drainage being reported by Mr. Hollinshead as very unsatisfactory. The water supply of the district is chiefly derived from wells sunk near the dwellings, and in many instances they are imperfectly constructed, and readily allow polluting matters to soak into them. As the mains of the Birmingham waterworks pass through some of the villages, there is the less excuse for permitting, in their case at least, this state of affairs to continue. The scavenging by contractors is reported as fairly satisfactory, but it would undoubtedly be well for the authority to undertake this work themselves. During 1878, 550 births and 281 deaths were registered in the district, giving rates of 36.6 and 16.6 per 1,000 respectively. Zymotic diseases caused thirty-eight deaths—a decrease of eight on the preceding year, and phthisis twenty-five deaths. Sixty-two deaths occurred in children under one year of age, and ninety-eight in children under five years. None of the zymotic diseases were exceptionally fatal, though measles and scarlet fever seem to have been prevalent in the spring. Mr. Hollinshead urges the provision of hospital accommodation within the district, as the Birmingham Hospital is too far off.

LAW REPORTS.

HIGH COURT OF JUSTICE.

CHANCERY DIVISION.

(*Before the* MASTER *of the* ROLLS.)

ATTORNEY-GENERAL *v.* LOWER THAMES VALLEY MAIN SEWERAGE BOARD.

This was a motion to restrain the above Board from applying any moneys out of the common fund contributed by the several suburban sanitary districts forming the district called the Lower Thames Valley Main Sewerage District, in payment of the costs of the introduction of a Bill in Parliament called 'A Bill to extend the powers of the Lower Thames Valley Main Sewerage Board', or towards the expenses of any late opponent of the Bill. The defendants were constituted by a provisional order in 1877, whereby certain districts therein mentioned were formed into a united district called the Lower Thames Valley Main Sewerage District, for the purpose of making a main sewer for the use of the constituent district. This order was subsequently confirmed by Act of Parliament, and by the order it was provided that the expenses incurred by the Board in carrying out their duties under the order might be paid out of the common fund raised by the different districts. It was now alleged that the defendants, instead of carrying out the purposes for which the united district was formed, had, without the sanction of the Local Government Board, determined upon a new plan for dealing with the sewage of the district, and it was said that in carrying out this new plan they had incurred various costs and expenses not within the provisions of the provisional order; that they had promoted a Bill to extend their powers, which was thrown out on a second reading, and had paid the expenses incident to promoting such Bill out of their common fund. This information was commenced by the Attorney-General on the relation of one of the ratepayers of the united district to restrain them from applying any portion of the joint fund otherwise than according to the provisions of the order.

The Master of the Rolls was of opinion that it was established law that where funds were intrusted by Parliament to a public body for a definite purpose, the Attorney-General was entitled to restrain that body from diverting these funds to any other purpose. It was also established that where such definite purpose was the execution of any particular work, as drainage, as in this particular case, the public body, not being a trading company, was not entitled to use the funds intrusted to them for another purpose, which was only anciliary or incidental to the specific purpose. On a consideration of the Acts of Parliament bearing on the case, he came to the conclusion that the defendants had no right to apply to Parliament without the sanction of the Local Government Board, and that what they had done was illegal. There must, therefore, be an injunction to restrain them from applying their common fund or obtaining any other fund for the purpose of promoting the Bill in question, or paying any expenses incurred in relation thereto.

PUBLIC MORTUARIES.

Dr. Tristram, the Chancellor of the diocese of London, recently gave an important judgment in an application made by Dr. Spinks, Q.C., on the part of the Duke of Westminster and Mr. Hugh H. Seymour, the churchwardens of St. George's, Hanover Square, for a faculty or license to authorise the erection of a parochial mortuary, with a post-mortem room attached, on the old burial ground, situate between Mount Street and South Street, Grosvenor Square.

The learned Chancellor, in giving judgment (the case having been argued on former occasions), dwelt upon the importance of such erections, on public and sanitary grounds. The application was opposed by Mr. Hall, the lessee and occupier of a house in Mount Street, abutting on the burial ground, on behalf of himself and other inhabitants, and also by Lord George Paget, the lessee and occupier of a house in Farm Street, on the ground that the Court would be exceeding its jurisdiction and that the site was unsuitable, and the erection would be injurious to the health of the neighbourhood, as well as detrimental to the adjoining property. The question of jurisdiction was decided by him (Dr. Tristram) in the case of 'Hansard v. St. Matthew's, Bethnal Green', in which he held that the use of a portion of a churchyard as a temporary resting-place for the dead was not an illegal diversion of consecrated ground to secular purposes. The first question he had to decide was whether a mortuary was desirable for the health of the parish, and after referring to the evidence given as to the residences of the higher and lower classes, and the danger from infection by bodies remaining in sleeping rooms, and the opinion of the medical officers on the advisability of a mortuary, he (the Chancellor) had come to the conclusion that it was for the interest of all classes of society, for the higher as well as the lower, that, as far as possible, all danger should be avoided. It should be remembered that many of the working classes, who had only limited accommodation, were employed in making articles of clothing for the higher classes, and were brought into contact with the households of the upper classes, and in that way diseases might be communicated. The next question was whether the site proposed was the most convenient of the available places, and, after alluding to other sites, and the objection urged that on the proposed site its erection would be detrimental to house property, which was worthy of consideration, he had arrived at the conclusion that the erection of mortuaries in closed churchyards, with proper precautions as to health or annoyance, might take place. A further and more serious objection was whether the erection would be injurious to the public health, and after recapitulating the evidence of Dr. Tidy, Professor of Chemistry, and Dr. Corfield, the medical officer of the parish, he was of opinion that with proper safeguards there would be no danger. He would give directions as to the excavations to be made and for the removal of bodies, and that before the removal to the mortuary of a body which had died from infectious disease, disinfectants should be placed in the coffin, which should be screwed down. The faculty would contain a proviso that the removal should not be between 8.30 in the morning and 8.30 at night. He ordered costs to the parties opposing, and should also allow costs in future cases. The learned Chancellor made further provision, and said if there was any annoyance application could be made. The faculty would be issued accordingly.

BRIEF NOTES OF USEFUL CASES.

LIABILITY FOR ACCIDENTS.

1879. *Bathurst, Borough of,* v. *Macpherson.* "New South Wales Acts."—Nuisance in highway.—Accident to horse.—Many English cases reviewed and commented on. (L.R., 4 App. Cas., 256.)

VILLAGE GREEN.

1878. *Goddard* v. *Robson.* Strip of green 40 yards wide and bounding a road, enclosed by plaintiff.—Boundary wall pulled down by defendant in alleged vindication of the rights of the parishioners.—Evidence for the defence that games of all kinds had been habitually played on the Green: Replication that this had been done only by the license of the plaintiff's predecessors in title.—Verdict for the defendant.—New Trial granted, on the ground that the Verdict was against the evidence. (*Times*, Dec. 17, 1878.)

LIBEL ON MEDICAL OFFICER.

1877. *Haviland, Ex parte.* Alleged libel on a Poor-Law Medical Officer.—Whereupon a correspondence between the parties.—Rule for a Criminal Information refused.—*Per* Cockburn, C. J.:—"If a party chooses, instead of coming direct to this Court, to enter into a correspondence, and receive explanations, it is not usual for this Court to give leave to file a Criminal Information. (41 J. P., 789.)

PURCHASE OF LAND.

1878. *Littler* v. *Rhyl Improvement Commissioners.* "Lands Clauses Act, 1845," s. 92.—Notice to treat for land.—Lapse of notice.—House built on land after the lapse and before new notice to treat was given.—Held nevertheless that the position of matters at the time of the first notice fixed the relative rights of the parties, and that the Commissioners could not be required to take more than they originally gave notice for, namely, a certain plot of land as unenclosed and unbuilt on. (W.N., 1879, p. 30.)

POWERS OF LOCAL BOARD.

1878. *Newington L. B.* v. *North Eastern Railway Co.* Application by a Local Board to the Railway Commissioners for an Order to compel a Railway Company to erect a station where none existed.—Judgment in part for the Board, with half the costs. (*Times*, Nov. 27, 1878.)

RATES.

1720. *Rex* v. *Dorchester J. J.* The Court of King's Bench will not meddle with the goodness or badness of a Poor Rate.—Whether it be a fair Rate or not is for the Sessions. (1 Str., 393.)

SEPARATE PRIVIES.

1879. *Reg.* v. *Clutton Union.* "Public Health Act, 1875," s. 35.—Whether rebuilt cottages shall each have a separate privy, or whether one shall be deemed sufficient for two cottages, is a fit matter for the discretion of Justices. (48 L.J., M.C., 135; 43 J.P., 332; [*Clutton* v. *Pointing*] L.R., 4 Q.B.D., 340.)

RECREATION GROUNDS.

1879. *Reg.* v. *Hambly.* "Recreation Grounds Act, 1859."—By-Laws.—Breach by a photographer plying his trade on Sundays.—The breach of By-Laws made by Managers and Directors of Recreation Grounds under this Act is an indictable offence. (43 J.P., 495.)

RATES.

1879. *Reg.* v. *London, Brighton, and South Coast Railway Co.* Parish not all benefited equally by a Local Management Rate, and Rate therefore eased on arable land by the Rating Authority.—Held that the Authority had a discretion and had rightly exercised it.—*Howell* v. *London Dock* followed. (48 L.J., M.C., 116; 40 L.T., 716; [*L.B.S.C.R.* v. *Lewisham*] L.R., 4 Q.B.D., 389. 43 J.P., 316.)

DISTRESS WARRANT.

1878. *Shepperton Overseers* v. *Baker.* On a Rate Collector absconding with parish money in his possession, new Rate made to cover the defalcations.—Payment of Rate refused on the ground that the sureties ought to have made good the amount, and that Rate was retrospective.—Held that, though these might have been grounds of Appeal, yet that, in the absence of an Appeal in regular form, Justices must issue Distress Warrants. (*Times*, Dec. 23, 1878.)

HIGHWAY INCLOSURE.

1879. *Turner* v. *Crush.* "General Inclosure Act, 1845," 8 & 9 Vict., c. 118, s. 68.—Proceedings for the inclosure of waste lands in a parish.—Certain ways held duly extinguished under an Inclosure Award, and Action of Trespass held maintainable against a person entering the lands where the ways had once existed. (48 L.J., Ex. 481; L.R., 4 App. Cas., 221; 40 L.T., 661.)

MEETINGS.

1875. *Vaughan* v. *Hampson.* Action for assault.—Plaintiff present by request and leave of defendant at a meeting of creditors of a bankrupt.—Defendant, chairman thereof, in which capacity he ejected plaintiff by force.—Held that under the circumstances plaintiff was entitled to attend the meeting, and was no trespasser; Action therefore held maintainable. (33 L.T., 15.)

RECREATION GROUNDS.

1879. *Whalton Village Green, In Re.* House and land bought by plaintiff.—The land lay between the house and a public highway, was unenclosed, and was long used by villagers for Recreation.—Land subsequently enclosed by plaintiff with a wall.—Wall pulled down by a mob of villagers in assertion of their alleged rights.—Action of Trespass.—Verdict for the defendant, a villager. (On the N.E. Circuit: *Times*, July 14, 1879.)

HIGHWAY.

1879. *Woodard* v. *Billericay L. B.* "Highway Act, 1835," s. 65.—Duty as to keeping trees lopped.—The word "owner" in this Section is to be deemed to mean the actual occupier, whether "owner" properly so called, or a mere tenant.—Service of notice on the occupier therefore suffices, and the owner of trees is not entitled to any notice. (48 L.J., Ch., 535: L.R., 11 Ch. D., 214: 43 J.P., 224.)

REVIEW.

An Hour with a Sewer Rat. By G. G. HOSKINS, F.R.I.B.A. London: Simpkin, Marshall and Co. 1879.

The poet Homer, in the Batrachomyomachia, makes a mouse to discourse very feelingly of friendship and of war; and some four centuries afterwards Æsop accorded to nearly every Zoological specimen he was acquainted with a ready gift of speech, and a deep discernment of human ways. These philo-

sophers, however, never ventured to make their animals speak of architecture or engineering, and it was reserved for our author to make a rat profess to understand both.

The rat in question commences by stating that the sewer is the domain of himself and friends, and that they would never invade the house drain were the latter in a fit state to forward the sewage to the sewer. The rat naturally approves of a sewer inlet without a flap, but thinks that in the interests of humanity it would be wise to use a Doulton's Junction Block. The rat quite agrees that great mischief results from badly laid drains, and instances several kinds of defective jointing, in which we observe nothing new. The architect is the next lecturer upon sanitary matters, and the rat listens—in his turn taking lessons—mason-like from the tracing-board before him. He hears of junctions and traps—dip traps and D traps—but only the former is denounced, and, although the scullery grease difficulty is touched upon, neither architect nor rat helps us to a section or description of a contrivance of this kind, from which the grease can be periodically removed, and prevented from clogging the house drain. The architect forgot this, and it was scarcely the interest of the rat to remind him of it. Then follows a description of sundry patent traps—Buchan's and Greenwood's arrangements occupying some fifteen pages, and Stiff's and Dodd's some five more out of the total sixty-eight which compose the *book*. The rest of the discourse was devoted to a description of trap fittings for sinks, in which the bell-trap meets with a friend at court. About this time the architect finds his friend—*mentor and pupil in one*—to have decamped, and his fire to have gone out.

There is nothing to find fault with in the subject-matter of this little *brochure*, except the recapitulation of the differences between certain patent traps, and a rather unwise adulation of a system of disconnection which the author could not have himself tried or experimented upon, as he ought, before recommending it. It might be fairly said, too, that there is absolutely nothing new in the work. Such a production cannot possibly instruct professional men of any kind, or they must be sadly behindhand, and is, at best, fitted to furnish, in the upper nursery, the rudiments of the constituents of a healthy home. As a contribution of this kind it will be welcome, but we cannot help saying that many will purchase it only to be sadly disappointed with the very little information which that particular *Mus decumanus* had to furnish.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

THE PARKES MUSEUM OF HYGIENE.

IN the notice of the opening of this museum, which appeared in the number of your journal for the 15th instant, its position is spoken of as 'almost inaccessible'. Will you allow me to say that the approach to the museum is by two flights of stone steps, three feet six inches in width, winding in a well-hole ten feet in diameter. We have experienced no difficulty in getting many bulky objects into the museum, and no complaints as to difficulty of access have reached us from the many hundreds of persons who have inspected the collection. It would be an undeniable advantage if the museum could be arranged upon the ground floor of a suitable building, although we might thereby lose the benefit of the sky-light, which now sheds its light directly upon the objects which are placed in the centre of the museum.

G. V. POORE,
Honorary Secretary to the Executive Committee.

TRUMPET-MOUTH OUTLET VENTILATORS.

THE 'Dictionary of Sanitary Appliances', now being published in your columns by Mr. Eassie, will not only be found both interesting and useful to the general public, and to all interested in sanitary matters, but the historical *resumé* or data therein given will be found worth consulting by intending patentees, in order to see what has been done by others before them, while the name and date will enable enquirers to find out whether or not certain articles ever had a 'patent' at all, or, if such existed, whether or not it has now lapsed, and is the property of the public—the original idea being open to improvement by any one.

In regard to the statement at page 35, that Dr. Bond expressed an opinion that a vertical tube, with a trumpet-mouth, 'would afford the best possible exhaust action', I beg to state that in practice he will be found to be mistaken. I made various experiments with these trumpet-mouth outlets, and found that while they largely increased the amount of outlet over that of a plain pipe, yet the trumpet-mouth allowed of down draughts more easily than certain other ventilators, while it did not draw out as much as these latter. *E.g.*, to select from an experiment made in August 1878, with a plain 4-in. pipe, a trumpet-mouth 4-in. at bottom, and 9-in. at top, and one of my induced-current fixed ventilators for 4-in. pipe, the outlet of each in four minutes, in lineal feet, was as follows:—plain pipe, 800; trumpet-mouth, 1,400; Buchan's 4-in. fixed ventilator, 1,960.

Then as to down-draught, another experiment showed in one minute:—plain pipe, up, 30ft; down, 40ft. Trumpet-mouth, up, 200ft.; down, 25ft. Buchan's 4-in. fixed ventilator, up—250ft.; down—none. The latter wavered occasionally, but indicated no blow down. At another time, during a gale of wind, Lloyd's 4-in. fixed ventilator blew down in two minutes at the rate of 820 feet. It is made somewhat on the trumpet-mouth principle. During this same experiment, one of my 3-in. fixed ventilators drew up 550 feet in two minutes, while Boyle's air-pump ventilator blew down for the same time 490 feet. The reason of the blow down in the latter, I believe, being that it is made much too open, while the divisions in it, I consider, did no good in this case. Scott-Dunn's 4-in. cowl, at same experiment, blew down 220 feet in the two minutes, so I did not believe in any great virtue, in practice, of the extra cone. Small models, and full-size ventilators, are two different things.

I was sorry I was unable to try Banner's revolving cowl—the style shown in first diagram at page 37—at this time, but I believe it would have acted differently from Scott-Dunn's, and shown no blow-down, but a considerable amount of up-current. One of my 3-in. glycerine cowls showed 480 ft. up, but I was astonished to see the 3-in. fixed ventilator beat it. If a fixed ventilator can be got equal to any cowl, then the former is preferable, as it cannot get out of order, stick fast, or stand the wrong way, while there is little wind.

W. P. BUCHAN.

CORPORAL PUNISHMENT.

[The following communication has been published in the *Boston Medical and Surgical Journal* for August 14, with a request that other journals should copy it. We cordially comply with the request, and hope thereby to assist Dr. Marsh in his laudable endeavours.—ED.]

My attention has for a number of years been called to injuries caused by occasional cases of too severe or recklessly executed punishment of school-children. Foremost educators, while not believing it expedient to prohibit corporal punishment, acknowledge that injury, injustice, and sometimes death even, do now and then occur from its use. These serious results may arise from fright, or from concussion of the brain, produced by merely jerking the child about, or, the most frequent cause, inflicting the punishment upon the child's head. I have known death to occur solely from the fright, although fatal results are not likely to arise except from immediate blows upon the head. No one form of punishment is so dangerous as boxing the child upon the ear. Not only is injury to the organ of hearing often produced, but inflammation of the brain frequently follows, and death has been the result.

In the family this matter of injurious methods of chastisement is not by any means beyond our influence if we will but take pains to inform the people upon the subject. If corporal punishment is allowed at all in schools, its use ought to be carefully guarded. No teacher should be allowed to correct a child by rudely jerking it about; by striking it anywhere upon the head, or with any instrument whatever, except it be flexible and with smooth edges. These requisites are best fulfilled by a rubber strap with rounded edges. Moreover, no punishment should be permitted except it be inflicted in the presence of a principal, another teacher, or a school trustee, as a salutary check upon undue temper or excitement. Every case of corporal castigation should also be reported in writing to the board of school trustees, stating the offence of the pupil, and the manner and severity of the punishment. I have known the above rules, adopted by a board of school commissioners, to reduce the number of cases of corporal punishment 88 per cent. in one month, and the schools continued meanwhile even more orderly and satisfactory than before.

I am about collecting statistics of serious and fatal injuries caused by corporal punishment, and I write this article to request all the readers of this journal to forward to me statistics and history of all cases that may come to their knowledge; state the date, place, name of child, character of chastisement, and its results; also the offence for which the punishment was inflicted. Add other points, history, etc., if time and inclination suggest.

I urge all to give the subject the little attention needed, to write me the main facts at least of all cases that they have known, and thereby make the report more valuable. The information thus obtained I will communicate through this journal.

B. P. MARSH, A.M., M.D.

Bloomington, Illinois.

Mr. John T. Eayres, of Newcastle-under-Lyme, has been appointed town surveyor of West Bromwich, at a salary of £300, in the place of the late Mr. Lofthorne. There were 142 applicants for the appointment.

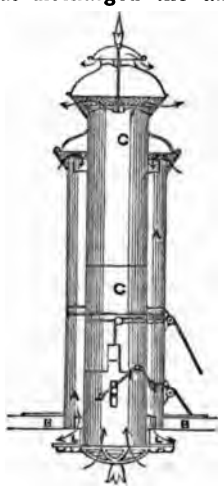
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 81.)

AIR.—XXVI.

AIR INLETS AND OUTLETS.—*Double tube order of Ventilators.*—Mr. McKennell's system of ventilation, upon the principle of the double current, was invented by him in 1855, and consisted of an automatic apparatus, to be fixed in the ceiling and roof, which not only provided a steady influx of fresh air, but discharged the air vitiated by respiration or combustion. The apparatus consists essentially of two tubes, concentrically arranged, and opening at their lower ends into the apartment to be ventilated. These tubes communicate with the outer air at different levels, the respired air rising up the central tube, and passing off at the higher level, and the fresh air entering the annular passages between the inner and outer tube at a lower level, and descending into the room below. The inner tube projects a short distance above the outer tube, and is capped by an ornamental cover, from beneath the edges of which the foul air escapes.



McKennell's Double Tube Ventilator. A, outer tube; C, inner tube; B, ceiling; L, valve-plate; I, throttle-valve for inner tube.

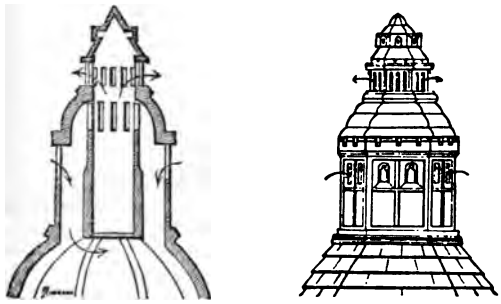
A screen of perforated material covers the escape opening, and prevents the inroad of foreign matters into the tube. Both of the tubes are so proportioned, that the sectional area of the centre tube is about equal to the sectional area of the annular passage comprehended between the two tubes.

Mr. McKennell, in this invention, arranged for a partial or total closing of the inner tube by means of a kind of throttle valve, set upon a transverse spindle inside the tube, and weighted on one side, so as to have a tendency to maintain a vertical position, and leave the passage full open. The valve was, however, under control by means of a cord and pulleys. When the valve appertaining to the outer air passage was drawn up as high as possible, it completely closed the down draught passage; whilst, by letting it down more or less, the passage was correspondingly opened, and the current of air infringing upon the valve plate became deflected, and spread out horizontally, and so became more uniformly dispersed over the room.

The McKennell system of ventilation has been largely patronised, with the best results, and it is applicable to almost every kind of work. Several examples of its adaptation to rooms can be noticed in the *Practical Hygiene* of Drs. Parkes and De Chaumont.

An ancient example of a natural inlet and outlet of air, upon a similar principle, is to be seen in the kitchen at Glastonbury, which was erected by the Abbot Breynton, some four hundred years ago. The

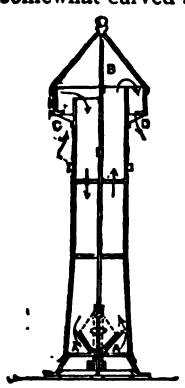
kitchen contained four immense fireplaces, one in each corner, and there would consequently be a very considerable quantity of heated air to get rid of. The kitchen is about 39 feet square, and there is a door in the middle of the south side, and another opposite to it. A high pitched stone roof leads up



Ventilating Lantern with Inlets and Outlets.

to an octagon-shaped lantern, supported by arched ribs, and is connected at the top by a circular curb, which forms a base for the inner part, and which acts as the shaft of the lantern. Fresh air would, therefore, enter at the openings at the upper part of the lower upright part of the lantern—no matter from which side the wind happened to blow—and meeting the heated air from the interior, at the base of the circular curb, would drive it up the inner shaft—and force it, and the smell of the cooking viands—to find an exit by way of the top outlets in the upper part of the lantern.

Syphon or Double Current Ventilation.—In 1852 Mr. Charles Watson of Halifax introduced to public notice his syphon system of ventilation, which attracted attention, and has held its own ever since. This apparatus is generally composed of a cylinder somewhat curved at its lower part, and with its upper part terminating in a hood of conical form, with ornamental bordering. The interior of the apparatus is divided by an upright partition, and there is a horizontal partition near the lower part of the apparatus, having therein two openings closed by valves, which by means of cords may be opened at any convenient position. The tube, when fixed, passes through the ceiling or roof of the building, so as to communicate with the outer air. Mr. Watson was among the very first to arouse public interest to the importance of ventilation, and his successors, Messrs. Hill and Hey, whose experience ranges over a quarter of a century, have succeeded in making some still further improvements in this kind of ventilation.

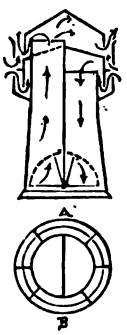


Watson's Original Double Current Syphon Ventilator. A, A, valves; B, conical cap; C, air inlet; D, foul air outlet.

A B C D

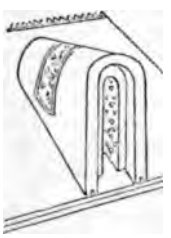
Hill and Hey's Syphon Ventilating Valves. A, full open; B, half open; C, quarter open; D, shut.

Perhaps the most sensible remarks ever made by manufacturers upon the subject of ventilation have been published by Messrs. Hill and Hey, who prefer to repudiate the statement that 'if proper inlets for air be provided the outlets may be generally left to take care of themselves'. When this syphon or double current ventilation is in use the doors and windows may be kept shut, as the opening of these do not assist the ventilators, but only cause draughts. Still, it is not necessary to have the doors and windows shut, and the whole is controlable by the valves. In warm weather the ventilators may be kept wholly open, both day and night, and the same in cold weather, if at all possible. The value of this natural system of ventilation is even noticeable at the fireplace, where a descent of smoke is all but impossible.



Hill and Hey's Excelsior Syphon Ventilator. A, section; B, plan of top.

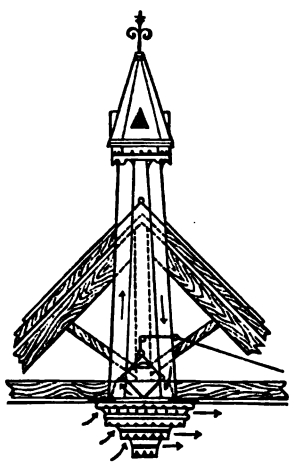
The above A B C D system of valve movement is common to all these ventilators, and is an especial feature in the last invented (1875) arrangement of Messrs. Hill and Hey of Halifax, which bears the name of the Excelsior Syphon Ventilator. This action is an improvement upon the original one of Mr. Watson's, and it is manufactured of zinc, with gutters, etc., to carry off the water of condensation. They are coated inside with suitable varnish, which adds to their cleanliness and durability. They are also manufactured in almost every variety of design, so as to chime in with the elevations of all kinds of architecture.



Hill and Hey's Excelsoir Syphon Ventilating Dormer.

The same engineering firm have also contrived to produce upon this improved system a ventilator for use in dormer situations, and intended also for bulidings with open roofs, where the tubular ventilators are not suitable, or cannot be used. But these are not otherwise to be preferred to the tubular forms, and are only manufactured to meet a special want in the trade.

Another pattern of syphon ventilator was produced in 1872 by Messrs. Lawson and Hainsworth of Halifax upon the same principle, however, as the original one, viz., the natural creation of two currents of air, one upward and one downward, in two shafts of unequal lengths. Here the two shafts terminate at the ceiling surface in a coronal, the object aimed at being to direct the draught along the ceiling, and to prevent a direct down current upon the heads of persons sitting or working below. The coronal is divided like the shaft, and each half is furnished with horizontal shelves of louvres which effect this system of air direction along the



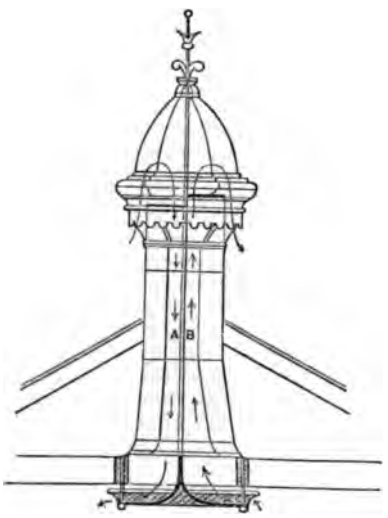
Lawson and Hainsworth's Syphon Ventilator.

ceiling line. The ventilator is also furnished with valves, copied from the original Watson pattern of 1852.

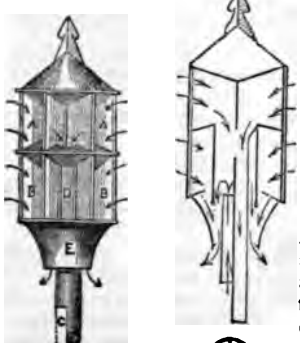
These manufacturers have also devised what they term Double current syphon wall Ventilators, which are supplied ready to fit in the wall, and made with valves, which are opened and closed by means of a cord. They are intended to be used where it is impossible to fix a tubular ventilator, and the sizes range from 9 inches by 6 inches upwards. The incoming current is broken up, so as to prevent strong and cold currents.

Lawson and Hainsworth's Syphon Wall Ventilator.

In 1873, Mr. Mitchell, of Halifax, introduced his idea of an Improved Watson Syphon Ventilator, and he contrived a deflecting plate, which he suspended underneath the orifices. This plate is so arranged as to tend to spread the air along the top of the room. The incoming and outgoing currents of air are entirely separated, as in all good double-acting ventilators, and not allowed to mix with each other at the mouth. The usual valve in the body of the tube is here dispensed with, and the tendency to a strong downward draught otherwise provided against. *All* these systems of syphon ventilators are the outcome of the original pattern of Mr. Watson, invented by him nearly thirty years ago. All the syphon ventilators known in the English commercial world are manufactured in Halifax. A present example of a double-action ventilator, of a similar character, is furnished by Mr. C. R. Stevens, of Lee Green, London. Here the tubular pipe communicating with the apartment is divided into two halves, and half of this double shaft is carried through the top of the cap. The top of the shaft being furnished with partitions meeting in the centre, the air infringing upon the partitions is deflected down one section of the shaft—which end is kept lowest when fixing—and the under part of the cowl, having a cap over one section of the shaft, with a conical rim at the bottom, the air being deflected down through the bottom rim by the lower partition, causes a partial vacuum under the cap, which creates an updraught in the other section of the shaft. It is a useful form of ventilator, in regard to the delivery and discharge of air in underground places, when no side windows can be got—and also for rooms under certain circumstances.



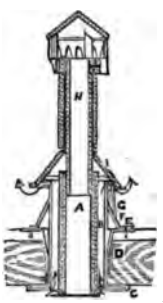
Mitchell's Syphon Self-Acting Ventilator.
A, inlet shaft; B, outlet shaft.



Stevens' Double-action Ventilator.
C, C, double shaft; D, cap; A, A, partitions at top; B, B, lower partitions; E, conical bottom rim.

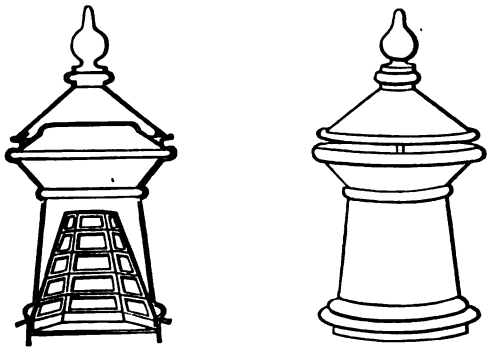
Outlet around Chimney-pipe.—This is sometimes a very desirable matter, and especially so where stoves are used, but I do not know of any English example. The simplest form is an American invention, which I will describe.

An outer casing of iron is here attached by a flange to the ceiling of the room or hut, while the body and the whole support of the chimney is held by supporting straps rivetted to the outer casing, and fastened to the roof timbers. No water from the outside can possibly enter the interior, owing to two sheet metal plates which clasp the outer casing from opposite sides. The chimney extension tube is fitted into the upper end of the chimney-shaft proper, and protected from rain by a cap. Lower down a second capping is formed by the flaring out of an outer casing, and as this extends around the base of the chimney outlet, the entrance of rain is prevented into the ventilating passage, while the lowermost cone-shaped surrounding prevents the rain entering at the roof timbering. The heat imparted by the smoke in its exit, and by the gases of combustion passing up the chimney flue, heats the air in the ventilating space around it; and as the air rises from the interior of the room to seek an exit, a draught is caused which serves to ventilate the room in which the stove is placed. To prevent the corroding action of the air upon the outer surface of the sheet-iron of the chimney, a tin casing is placed next to the ventilating space, lopped at the joints, and rivetted as well. As the outer air casing also surrounds the chimney, and as no solder is used, no accident of burning can result, and the accumulation of soot is almost impossible. As the inner flue, moreover, is nowhere in contact with the wood of the roof, all danger of fire is prevented there.

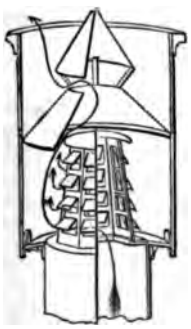


Combined Ventilator and Chimney.
A, chimney shaft; H, chimney extension tube; B, outer casing; C, flange; G, close-fitting ring; E, water-proof connections; D, supporting straps.

Mica Valved Outlets for use in Roofs.—Several of these useful contrivances have been invented, and the best of the patterns is perhaps that of the late Mr. Boyle of London, now manufactured by Messrs. Comyn Ching and Co. The ventilator is surrounded by a weather casing, and the interior is fitted up with a series of mica valves, rising conewards, which are actuated by the slightest movement of air seeking to escape.



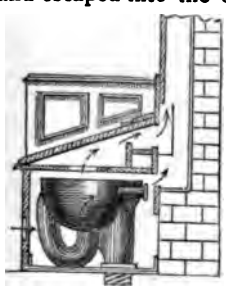
Boyle's Roof Outlets, with mica valvings.



Mica-Valved Roof Outlet.

Another pattern of this self-acting turret form of outlet is also manufactured in London, and in this case the two cones surmount the valves, which are copper-hinged to the cast-iron framing, and the whole is surrounded by a galvanised iron cylinder. Any rain which may fall upon the cones is removed by way of escape apertures which are placed at the foot of the lower cone. The heated air from the room rises up the circular or other shaft—circular shafts are preferable in all cases—and, passing the valves, finds an exit at the annular space between the cones.

Air Outlets from Water-closet Framing Interiors.—Several arrangements have been contrived to provide an outlet for the close—and even worse condition—of air which is found to prevail underneath the seats and behind the risers of water-closets, and also for the air which may have saturated the trapping water and escaped into the closet room, to say nothing of the air evaded during the moments of voidance. Perhaps the best contrivance of this kind is that of Mr. T. Waller of London, who fixes an inclined cover—hinged at the back over the seat—like a kind of blower—and leaves a space between this and the seat-top, which is placed in connection with a foul air duct. This duct is at the back of the closet, and has a divided mouth-piece, the lower part opening below the seat, and the upper part above the basin level. When the closet is in use and the flap up, a lever closes the space above the seat, and increases the draught under the closet seat—the inlets to such space being placed in the front of the seat. Preferably, he builds the foul air tube in the wall, and if there be several closets over each other, he runs them up to the roof together, and connects them to the interior of an extractor.

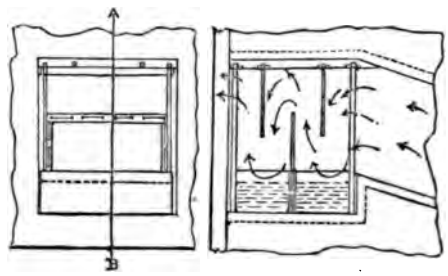


Waller's Ventilated Water-closet and Seating.

Another closet-ventilating apparatus, highly commended, it appears, is that of Dr. Aldridge of Southampton, and here the handle cannot be pulled up till the lid is closed. The lid, too, fits air-tight fashion to the seat, by means of an india-rubber ring, and any foul air derived from the basin or pan is led by a pipe to the outer air, while to prevent the escape of air between the basin and the seat, lead close flashing is used. This contrivance, has, doubtless, a certain value, especially where the use of pan-closets is persisted in, as the lid must first be shut down before the flushing can take place.

Aldridge's Ventilated Water-closet Basin.

Air Disinfecting Inlet for use in Walls of Sick Rooms.—By the kindness of Prof. De Chaumont, I am enabled to explain the working of a small apparatus of this kind, the whole size of which is about nine inches by eight inches. It consists of a square shallow trough, above which is supported a metal roof, and from the latter depend two metal plates. Two other metal plates are placed vertically in the trough, and consequently the plates are about four inches apart. The vertical plates support a piece of house flannel, which is previously wetted, and the trough being filled with about 20 oz. of medicated liquid, the flannel absorbs it by capillary attraction, and remains wet until all has been evaporated. In practice, the air from the inlet passage first strikes the wet flannels, and passes through it and over it, in which latter case the entering air is deflected by the depending metal plates down upon the surface of the water in the trough, twenty parts of which is mixed with one part of carbolic acid solution.



Dr. Langstaff's Air Disinfecting Inlet, in elevation and section.

This special contrivance—devised by Dr. C. Langstaff—not only impregnates the air and prevents organic germs in the room from developing, but organic matter from without is also arrested on the flannel, with the best of results. Elaborate experiments were made with this apparatus, the details of which will be found in Dr. Langstaff's Address on *Hospital Hygiene*, published by Churchill, London.

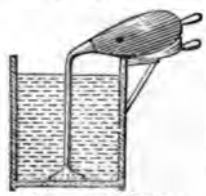
Inlets of Air to Deep Wells.—It is sometimes found dangerous for workmen to descend deep wells, owing to the prevalence of carbonic acid gas, and if the atmosphere there will not support a candle with the proper air necessary for combustion, means have to be resorted to in order to supply the requisite amount of oxygen.

The primitive method was to lower down a quantity of sedge-grass, in a burning condition, which caused a circulation of air—and similar articles of

bulk were violently lowered up and down to ensure the same end, mechanically—both practices being attended with more or less success—depending upon the depth of the well. Another system adopted was the lowering of newly-slaked lime to the level of the irrespirable atmosphere, this substance greedily absorbing the carbonic acid. The lime was sent down in a milk of lime condition, and it may thus be said that twenty-eight parts of that emulsion absorbed as much as twenty-two parts of carbonic acid gas. When the lime can be broadly exposed and well moved up and down, the good effect is enhanced.

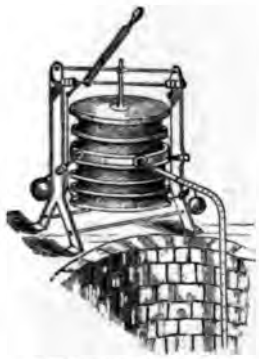
The foregoing methods are now, for the most part, rendered obsolete, recourse being had to the direct supply of oxygen from the upper air, by means of fans or bellows.

The system of supplying air to the bottom of wells by means of bellows, so as to support human life during repairs in the steining or the shafting, is very simply illustrated by the action of the bellows used by American dairy-men for aërating and cooling their milk, and so ridding it of the cowey flavour, which is simply the odour derived from the waste material of the cow's body, and, like other decomposing matter, is consequently infectious, or at all events certain to taint the milk, if it be not removed. Several kinds of these bellows are in use in Utica and other States of the Union, and sometimes the supply of air is cooled in a neighbouring ice-box before being passed into the body of the milk.



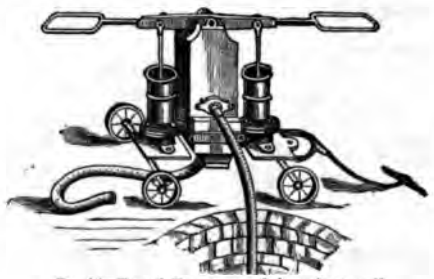
Air supply by Bellows for the displacement of the animal heat in milk.

The simplest pair of ordinary-shaped forge bellows, of say about 5 feet, will suffice for the purpose of a well of about 100 feet in depth, but the best pattern of bellows would be the double blast kind, which is necessarily far more powerful. Another excellent apparatus for the purpose is the Cyclops hand-blower, sold by Rownson, Drew, and Co., of London, and this is frequently made use of by eminent well-sinkers with up to 200 feet of tubing. The tubing is usually light, 3-inch wrought iron pipe with flanges to screw on. The blower is perhaps the most effective article, and is more economical than the double blast bellows. It can be had in a very simple form, and without the sun and planet gearing motion shown in the illustration.



Double Blast Bellows for supply of fresh air to deep wells, etc.

Cyclops Hand-Blower for supplying air to deep wells.



Double-Barrel Pump, supplying air to well.

A Double-Barrel Fire Engine Pump is often fitted up for the purpose of pumping fresh air into the bottom of wells, and they act handily, as they are nearly always to be met with on large estates. The simplest method of using them is to throw the suction pipe on the ground, and attach a hose over the nozzle to lower into the well. A pair of 5-inch pumps will be as much as two men can conveniently work.

As may easily be supposed, there are other means extant for supplying air to places where noxious gases prevail, but they can hardly be said to come within the scope of these papers. The system introduced by Mr. Rouquarol in 1864 may be taken as an example. He employed an air-chamber and pumps for supplying compressed air to an air vessel, which could be carried on the workman's back, and a tube led therefrom to his mouth—a compressionary strip of india-rubber fitting between the lips and the teeth.

Another system, that of Mr. Giachosa, facilitated the removal of the irrespirable gas by the employment of a series of chambers reaching to the bottom of the shaft, the lowermost one being connected by means of a flexible attachment to a bell-mouthed collector. Motion was given by suitable mechanism to the partitions in the chambers, to effect the alternate expansion and contraction of such chambers for the reception of the gas, and for its being forced upwards. These elaborate contrivances, are, however, not necessary in an ordinary way, and the dilution of the foul air with oxygen by means of a bellows, a pump, or a blower, will be found sufficient for all practical purposes of well cleansing or repairing.

(To be continued.)

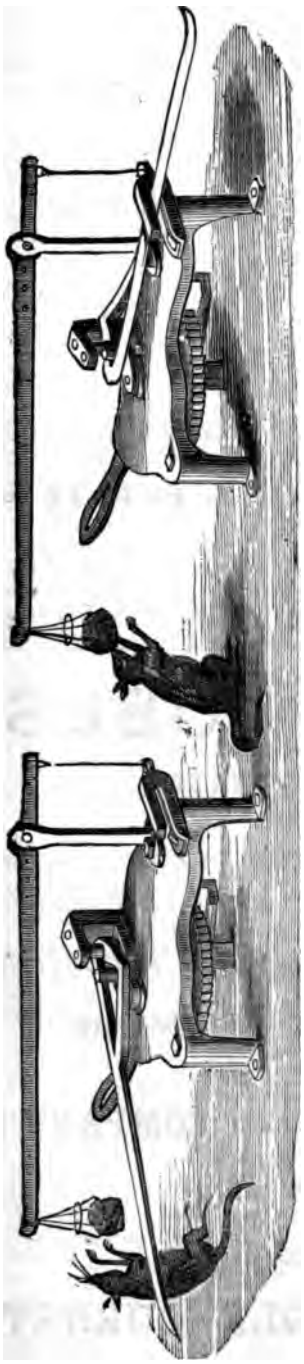
SANITARY INVENTIONS.

NEAVE'S FOOD FOR INFANTS AND INVALIDS.

A careful examination of Neave's Farinaceous Food has convinced us of its utility as a food for infants. It is most carefully prepared from the highest class wheaten flour, and contains notable amounts of its flesh-forming, respiratory, and saline constituents. A small quantity of the bran of the wheat is utilised in this preparation, which will consequently be found useful in promoting a healthy action of the bowels in its youthful consumers. As a substitute for the best of all infants' food, mother's milk, Neave's Food may be conscientiously recommended

as wholesome, nutritious, and calculated to supply all the elements of growth required by infants. It also forms a pleasant and nutritive aliment for invalids requiring a farinaceous addition to their usual regimen.

A RAT DESTROYER.



We have just become acquainted with a peculiarly ingenious and effective contrivance for the slaying of rats and other vermin in house and field, when peradventure these gentry invade the rights of man. It will kill instantaneously from nine to a dozen rats or rabbits, and is so beautifully constructed that it resets itself every time. For families tormented by an inroad of rats, or for farmers who are similarly pestered by destructive rodents, etc., up to the size of a cat even, there can be no more available and simple a cure. It is to be obtained from Mr. Griffiths, ironmonger, of Shrewsbury, and costs about twenty-five shillings.

Describing it technically, we may note that this patent trap consists of a small tripod stand or frame, which can be screwed down, and beneath it is fixed a small ratchet wheel and coiled spring in connection with the bow handle, shown in the illustration, for winding it up. When this is so wound up, and the trap baited for the vermin it is intended to destroy, the sword-arm is drawn back to a small catch holding the arm in the centre. By a slight touch at the baited end of the lever the sword is released, and swings round, striking a severe blow. Its action is then reversed, and it returns to the catch again, where it is held until the bait is again interfered with, and this will continue from nine to a dozen times.

JEYES' PERFECT PURIFIER.

This disinfectant, which consists mainly of coal-tar creasote, comes to us endorsed by many well-known names, as those of Professors Wanklyn, Dyer, Redwood, Gardner, Pepper, and Cameron. The powerful antiseptic and disinfectant properties of creasote are so utilised in this compound that it has been found highly efficacious in use in hospitals, private houses, and on board ships, as a disinfectant in disease and for domestic purposes generally. Its being non-poisonous must sufficiently recommend its use in families, in addition to the fact that it neither stains nor burns; whilst careful housewives will be glad to learn that, having a strong affinity for grease, it may be safely used for removing stains from silk, woollen, or cotton fabrics, furniture, etc. The Perfect Purifier is very economical in use, since one shilling bottle makes 30 gallons of disinfectant. It is sold retail by all chemists, and wholesale by Messrs. Dakin Brothers, Cree-church Lane, Leadenhall Street, E.C.

CREASOTE SOAP.

Some months since Mr. Vacher, in a communication to the *British Medical Journal*, published his formula of a disinfecting wash for use in sick rooms, the wash containing creasote and acetic acid. He stated that he had found people not unfrequently objected to preparations of carbolic acid being introduced into their apartments, and thus felt the want of something to take its place. *Liquor potassæ permanganatis*, and solution of chloride of aluminium, he found feeble or uncertain in action, and chloride of lime was as ill-borne as carbolic acid. The desideratum was a disinfectant which should be in every respect as efficacious as carbolic acid, and yet without its offensive smell, and Mr. Vacher pointed out that creasote exactly answered to this description. The wash, which has been in use for about two years by the Sanitary Authority at Birkenhead, was so much appreciated, Mr. Vacher was induced to try and incorporate it into a soap, and a sample of his results has been submitted to our notice, under the name of Creasote Soap. It is certainly an exceedingly elegant toilet preparation, delicately scented, and neatly got up. As it owes its disinfecting properties to one of the most reliable of known disinfectants, it cannot fail to make its way in public estimation. Medical men wishing to try this soap in their practice, can obtain it of Mr. Thomas Fore, 20, Market Square, Birkenhead.

Gilpin's *Forest Scenery* is about to re-appear in a new edition, with Notes and an Introduction by Francis George Heath, author of *Our Woodland Trees*. There has been no reproduction of Gilpin's famous work since the edition, published in 1834, by Sir Thomas Dick Lander, who, however, by a curious oversight, copied Gilpin's first edition of 1791, omitting all the important corrections made in the third edition of 1808. The present re-issue will be illustrated by 18 drawings on wood, all re-drawn from the original landscapes, etc., of Gilpin, and by a frontispiece engraving of Gilpin's church at Boldre; and it will be published very shortly by Messrs. Sampson, Low, Marston, and Co.

ORIGINAL PAPERS.

THE SUPPLY OF WATER TO RURAL DISTRICTS AND THE PUBLIC HEALTH (WATER) ACT OF 1878.*

By J. M. Fox, M.R.C.S., L.S.A.,
Medical Officer of the Mid-Cheshire Combined Sanitary District.

THERE could be few more interesting subjects of inquiry to the medico-legal student than the gradual growth and development of the aim and scope of our sanitary enactments. Beginning with the Local Government Act of 1848, passed in the eleventh and twelfth years of the reign of Her Majesty, there has been a continued movement in advance, until we are brought to the latest instalment of sanitary law, which it is proposed now to consider, namely, the Public Health (Water) Act of the year 1878, in the forty-first and forty-second years of the same gracious sovereignty.

Between these first and last Acts there have been many intermediate steps, amongst which it will be sufficient to mention the Diseases Prevention Act, 1855; the Nuisances Removal Act, of the same year; the Local Government Act, 1858; the same amended Act, 1863; the Sanitary Act, 1866; the same amended Act of 1868; the Public Health Act of 1872; and our final inclusive code of 1875.

It gives the stamp of public approval alike to those who have laid the basis of sanitary laws, and to those who have carried them out under the fierce glare of publicity, that this steady, unhalting, never receding march has thus been pursued. It is no less an encouragement to those who have devoted themselves to this department of medical occupation. The history of the past, and not a recent past only, admits of no other conclusion being arrived at than that we must and shall thus continue to 'lengthen our cords and strengthen our stakes'. As every previous advance in sanitary law has only been a stepping-stone to the next, so will it continue to be in the future, more especially as assured results are disarming a once hostile criticism, and expenditures formerly regarded as an unproductive tax are coming to be known as fraught with directly beneficial results.

Not to dwell too long upon the past, I take it that the most marked step in advance was made by the passing of the Public Health Act of 1872. Whatever may have been the faults of that most important statute, it did this, which was quite a new thing at that time, namely, it placed the *rural* districts of England and Wales under sanitary supervision. Towns with their more closely packed populations had before enjoyed the benefit, the exclusive benefit, of almost every solitary enactment of a sanitary character. Of the condition of urban populations much was known. The vital statistics of towns had been collated for many previous years, but, except by traditional conjecture, nothing was known of the sanitary condition of rural districts, or of the outcome of such conditions in the liability of their inhabitants to preventable sicknesses and untimely death.

It was a universal sentiment that 'God made the country and man made the town', from which many erroneous conclusions were drawn, such as, that health, domestic bliss, and a rural life were all synonymous terms. An inquiry into the sanitary character and condition of a picturesque rural retreat was laughed to scorn as a frivolous impertinence. These were the days when so many preventable complaints were unclassified, or, if so, were grouped only under the coroner's comprehensive summary, 'the visitation of God'. The word 'zymotic' had not then been coined by the medical creator of the registration department. Jenner had not worked out his theory of the specific nature of typhoid. Water was subjected only to the rude analysis of smell and taste. Where soot and smoke and artisans were not, and where roses bloomed unblighted, all sanitary details were taken as *couleur de rose* also. The wish would have it so. It would have been a heresy to think otherwise, nor had we any knowledge to incline us so to do.

But when, after the passing of the Public Health Act of 1872, a scientific and methodical inspection took the place of pleasant traditions, regarded as true only because congenital, how rudely all these delusions were dispelled! The laws of health were found to be of universal application. Rural transgressions of those laws were proved to be no more innocuous than such as were perpetrated in towns. In addition, it was found that a sense of security, combined with the thickest possible armour-plate of enveloping ignorance, had induced a recklessness which was already placing rural populations at a great disadvantage, in a sanitary point of view, as compared with the occupants of towns; and, in fact, that preventable diseases were no longer passing on by importation from town to country, but *vice versâ*, in quite equal, if not larger, proportion.

Not to pursue this subject too far in its general aspect, I hasten to observe that in no department of sanitary provision were the country districts generally found to be more at fault than in regard to domestic water supply. Here was an ever present peril to country residents, and an ever recurring one to their occasional visitors. Never was a more fatal delusion brought to light and exploded than that country water supply must be good. It would be nearer the truth to say even now that in proportion as we penetrate the country, and recede from towns with their approved water provision and delivery, in that proportion shall we encounter risk in the matter of the water we have to drink. Not that it should necessarily be so, but that by ignorance and bad practice, uninterfered with for long ages, it has become so.

It was about the time of the passing of the Public Health Act of 1872 that Mr. Sutton, now the analytical chemist for the county of Norfolk, read a paper before the British Association which produced a great sensation, on the character of the well water generally supplying private houses in the country. He stated that he had scarcely analysed a single sample of water brought to him from farms, gentlemen's seats, and private houses in the country, which had proved to be pure. It is easy to imagine how the difficulty has arisen. The pump has perhaps originally been well placed. But all kinds of abominations have been allowed to encroach nearer and nearer to the absorbing well; and, in the course of years, channels of communication have been opened out between them, or subsequent drainage works have been executed by ignorant labourers, with no town surveyor to superintend the work, and the result may be readily conceived. I have myself been present at the opening of an old well on the premises of a resident clergyman, where we found that a small

* Read at the meeting of the North-Western Association of Medical Officers of Health, September 25th, 1879.

drain, for which a convenient outfall was not at once apparent, had been made to discharge into the well! It was only an outbreak of a fatal form of diphtheria that led to the investigation being made.

In other instances, streams, originally pure and supplying small districts, have been allowed to be befouled by drainage. And, as an instance of ignorance and greed prevailing in rural districts, I may mention that if children and servants are ill from the consumption of polluted water, the water rarely or never comes under suspicion. But if cattle are affected and die, the water is at once the object of jealous suspicion, and the polluters of it may then receive very muscular retaliatory treatment from their neighbours.

It is often a cause of wonder what there is in agriculture that tends to make its professors so obstinately conservative. In all other commercial pursuits, progress and improvement are apparent from year to year, and discoveries and new methods are eagerly and intelligently hailed and expected as benefits. Not so in agriculture. New methods are undesired, unsought, and therefore unapplied. If it has been usual to waste natural manurial products, it must, on that sufficient (?) ground, for ever remain so. Similarly, if, in the home, stinks have always been of the essence of the surrounding atmosphere, there can be no injury in them. Thus I have stood face to face with a stalwart farmer, with a glass of freshly-drawn water between us, stinking with sewage, and he has, over the actual specimen of sensibly polluted stuff, declared it to be the best water ever drank, that he had drank it for forty years, and wished for no better! To us, who may reasonably suppose that such dogmatic ignorance may extend to other departments of the farmer's operations, agricultural depression is far from being an inexplicable phenomenon!

It may, I imagine, be said with truth that this lamentable, almost universal, deficiency of good domestically suitable water in the country was unknown and unrecognised before the passing of the Public Health Act of 1872. Hence there is no applicable provision therein. This, indeed, as I have already observed, was the great enlightening measure, which, by providing a machinery of investigation, discovered and placed on record the sanitary defects, impartially, of the country as well as of the town.

It is quite true, that in the Act of 1872 a Rural Sanitary Authority was, by section 8, constituted the Sewer Authority of that locality, in virtue of which the Sanitary Act of 1866 was brought within its powers, including the 11th section, which enables it, under certain restrictions, to provide its district, or a contributory place therein, with wholesome water. But this is the power only to deal with the difficulty by combination, and a public rate.

It will be readily understood that this power would only be a suitable provision in a very limited number of rural districts. There are always in them some large villages, with well defined parochial boundaries, just perhaps on the eve of adopting the Local Government Act, occupying a hybrid position between a village and a town. To such the remedy was sufficient, and many applied it, and reaped the benefit of it. But there is a vastly larger proportion of rural townships in which the population is widely scattered. To these a joint supply of water becomes, from the immense extent of unproductive pipe laying, an impossible achievement. And though even in these there may be groups of closely placed houses which could be well supplied *en bloc*, yet the rate to pay for it must be collected from the whole contributory place, and those unbenefitted will reasonably object, and frustrate the accomplishment of any such scheme.

The Consolidating Act of 1875 gave little further powers to Rural Sanitary Authorities in regard to water-supply than they previously enjoyed under the parent Act of 1872. They had no longer to go back to a measure passed in 1866 for their Authority to procure water for their district, or any contributory place therein. Every power, in this particular, is fully detailed in the comprehensive Act; and all former applicable statutes were repealed.

There does, perhaps, seem an attempt to deal individually with cases of defective water-supply in section 62. In virtue of this section, on the report of the surveyor, if it appears to a local Authority that any house within their district is without a proper supply of water, and that supply can be furnished at a cost not exceeded by the water-rate authorised by any Local Act in force within the district, or where there is not any Local Act, at a cost not exceeding twopence per week, the Local Authority are authorized to give notice to the owner to obtain such supply. But for all practical purposes, as accomplished by this section, the term *urban* Authority might have been substituted for local. That is to say, it was only possible to bring this section into service in districts where there was an available water-delivery, that is, in towns, or such very large villages as I have already spoken of. And here it is seldom required; as experience goes to shew that people, with their present rapidly increasing enlightenment, are very willing to relieve themselves from all liability to risk, save themselves from the coolie-work of carrying water, and get the other advantages of unrestricted house-service, when they can do so, at an expense of 2d. per week. Still, we must always remember that the law is made for evil-doers; and this was an important and necessary power to have. What I wish to observe is, that it is entirely inoperative in the wide-spread want of wholesome water in entirely rural districts, to which this paper has reference.

Hence we have, in the recent measure of Mr. Brown, the member for Wenlock, the Public Health (Water) Act of 1878, what I venture to call the individual method of dealing with the difficulty—a method which it is designed should be applicable in every isolated case. I say, this is the design and scope of the Act, not that there may be always the opportunity or possibility of giving to it universal application. But what it is of importance to note is, how great an advance has been made in a recognition of the want, and its finding practical expression in the Statute-book, and a provision whose object it is to give a legal *locus* in regard to water-supply to every single cottage in England and Wales. Here is not an additional power to effect great works by combination, but little works for each dwelling, or groups of dwellings, as their wants are made known by analytical examination.

Thus, in section 7 the duty of inspection is fully defined, and the power of entry given, in order that every dwelling may be reported on, and, under certain restrictions, the benefit of the Act fully realized in every family. The function of Medical Officers of Health, I conceive, in reference to the new Act, is to give it as wide an application as possible. It is our duty to be devising such methods of supply as may reduce to the very narrowest compass the

number of houses that might claim exemption from the operation of the Act by the limitations which the Act itself defines. I will say nothing of places where more might be done by wholesome pressure than has been done, either to procure a supply of wholesome water, perhaps from a remote source, either for a whole or a part of a district. Nor will I say anything about places where the thorough purification of streams, by a rigorous enforcement of the Rivers' Pollution Prevention Act, would do much to improve, and render thoroughly wholesome, the water of numerous villages through which such streams may pass. But, referring only to isolated houses in country districts, such as farmhouses, labourers' cottages, and others, practically left for supply to water found in or near their own curtilage, how may the Act be made operative so as to leave the smallest possible number of these outside the sphere of its beneficial application?

I have already spoken of the frightfully polluted character of the earth-supplied water in these situations. But where such polluted wells can be cleansed, all drainage matter excluded, thorough protection from outside tampering arranged for, and periodical subsequent examination of the water from time to time undertaken, these wells may be satisfactorily used. Further, the geological features may be such, in some localities, that good water is known to be procurable by fresh sinking in proper situations at no great depth. But in case old and new wells fail to give reasonable hope of a continuously satisfactory supply of wholesome water, what then?

After giving much thoughtful consideration to this subject, I have arrived at the conclusion that the only way out of the dilemma, a way to relieve the wants of the destitute, and to give the widest possible application to the new statute, is for us to give increased attention to the storage of properly gathered water coming down to us from above,—of rain-water. Whatever the soil may be, there is no place where the clouds are dry. It is conceded that in towns this source would be excluded from our consideration. It is well known that rain-water in towns is charged with many impurities; and, except as a washing water, or for slopping purposes, it is thus rendered valueless. I might recall the word valueless on the authority of Professor Rolleston, of Oxford. He advocates, and has done for many years, the general use of stored rain-water in under-ground tanks, as far the best water for domestic purposes when filtered through carbide of iron, silicated carbon, or Bischoff's spongy iron. But if this be the judgment of one whose science and good taste are both so consummate, in regard to those dwelling in towns, what can we not do in the country? No house, I contend, in this humid climate, need any longer be left on the plea that the law is inadequate, without this provision of life's first requisite.

It must be borne in mind that we are speaking of rural districts where the impurities of towns do not exist—even of scattered houses in rural districts. Of rain-water in such localities, even the sixth and last report of the Rivers' Pollution Commission, though it speaks generally disparagingly of rain-water, gives favourable testimony. Thus, page 417, it says that 'rain tank-water is decidedly superior even to the best of pond waters for dietetic purposes'. In common with Mr. Sutton, it condemns the shallow wells usually depended upon in the country, and gives two instances of a satisfactory change having been found in stored rain-water. I have myself submitted to analysis again and again samples of rain-water, collected in the country and in small towns, and have never found the albuminoid ammonia to exceed 0.12 parts per million. Whereas out of 250 samples of ordinary Cheshire country waters I have only found 38, or 15.2 per cent., that came below that figure, and a large proportion that very far exceed it.

The practical questions, it appears to me, are (1) as to sufficiency of quantity, and (2) the limitation of cost specified in the Act.

In the matter of quantity, very interesting testimony is given in the Report of the Rivers' Pollution Commission, from which I have previously quoted. Thus, it gives an account of a block of poor cottages at Crage Pond, in the neighbourhood of Goring, in which fever occurred, attributable to bad drinking water. The owner afterwards provided a tank 10 ft. deep and 8 ft. in diameter, which receives the roof water; and this, after settlement, is now preferred by the cottagers to the water they used to drink. 'There are ten people', the report goes on to say, 'living in these cottages, one of whom, a laundress, uses a large quantity of water; and another, feeding a large number of pigs, also takes far more than an average quantity from the tank; yet it has never failed to maintain a sufficient supply for their wants.'

Much misapprehension, I have been led to think, exists as to the quantity of water consumed in rural households. Accustomed to the large estimates of town requirements, including many purposes for which water is necessary there, but finding no corresponding use in the country, it strikes us with astonishment that three gallons per head per day is an outside estimate for a village consumption. And yet I have proved this by water supplied to villages through a meter again and again.

Taking the usual average, therefore, of five and a half persons to a cottage, the quantity required for such a dwelling would be about 13¾ gallons. Now a cottage, with its outbuildings, says Mr. Wheeler, M.Inst.C.E., covers about 500 square feet of ground. Taking the rainfall at 22 inches per annum, a minimum estimate throughout the country generally, a slated roof will yield 5,700 gallons per annum, equal to a daily supply of 15½ gallons, or very nearly three gallons per head per day.

But the rainfall is, of course, unequally distributed throughout the year. And this brings us to the second question of cost. The cost specified in the Act, at which an Authority may make a compulsory order for water-supply to a house is thus defined: 'Not exceeding a capital sum the interest on which, at the rate of five per centum per annum, would amount to twopence per week'. This represents a capital outlay of £8 13s. 4d., and such, indeed, might as well have been stated in the Act with less circumlocution.

It is a very unusual drought that extends over two months. But it has become a rule amongst engineers that all storage receptacles, be they reservoirs for towns or tanks for cottages, should not contain less than 78 days' unrenewed supply. Thus a tank for a cottage covering 500 square feet would require to be 6 ft. 6 in. in diameter and six feet deep, and to hold 1,200 gallons. The cost of such tank is estimated at 1¼d. per gallon. Larger tanks may be reckoned at 1d. per gallon. Hence there is economy in making one tank serve for two or three cottages. At this rate, the cost of the water supply from heaven, independently of all chances afforded by the soil, and stored for permanent use, would be £6 5s. per house, or £2 8s. 4d. within the limit laid down by the Act.

It is easy to see that if public attention were thus increasingly given to dependence upon stored and collected rain water for domestic use, there would at the same time be more care as to cleansing of roofs and spouts and cisterns, indeed all the arrangements connected with such provision and collection. And who would not prefer to have the milk cans which supply our towns with milk cleansed with even roughly gathered rain water than with the perilous yield of wells or pumps, all made to receive, in bucolic ignorance or indifference, the soakage of privies or the direct outlet of drains? It will be perceived that there is no legal unoppressive remedy even for so gross an evil, unless a fresh and a pure source of supply can be guaranteed within a defined expenditure.

The plan I have proposed is submitted as a *dernier ressort*, available in every case in the country, and available compulsorily where Providence or human ingenuity affords no indication of a 'more excellent way'. There are many localities where springs of varying degrees of purity may be used in addition. There are others also, as in grazing districts, where land drainage may present valuable supplementary aid. But in regard to all these subsidiary methods there is the continual chance of poisonous excremental contamination, which in the scheme I have detailed could never occur. The particular sections of the Act may be reserved for further consideration.

THE

SANITARY RECORD.

OCTOBER 20, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE REPORT OF THE LOCAL GOVERNMENT BOARD.

FOREMOST amongst the subjects treated of in the report of the Local Government Board for 1878 are the expenditure and loan transactions of sanitary authorities, which are increasing in a most remarkable fashion. During 1877-8 the sanitary expenditure in England and Wales amounted to nearly eighteen millions, as against fifteen, fourteen, and twelve millions in the three preceding years. The receipts, however, show no such increase, there being only the difference of less than a million and a half between the receipts of 1874 5 and of 1877-8, which amounted to less than eight millions. The immense disparity between expenditure and receipts at once attracts attention, and shows at a glance with what zeal Authorities are availing themselves of the very large borrowing powers now accorded to them. That sanitary rates are increasing is patent from the fact that, whilst the rates raised by Urban Authorities have risen during the last three years from £6,200,000 to £7,600,000, or an increase of 22.5 per cent., the rateable value of the districts has risen from £41,150,000 to £48,370,000 only, or 17.5 per cent.; in other words, while the aggregate annual burden on the rateable property of these districts has grown to the extent of 22.5 per cent., the aggregate capacity of the property to bear the burden has grown at the rate of 17.5 per cent. only.

During the year reported on, Sanitary Authorities raised loans to the extent of eight millions of money, against four and a half, five, and four millions respectively in the three preceding years. The total outstanding loans of these Authorities now exceeds forty-six millions and a half. In explanation of this apparently enormous sum, it must be observed that many of the loans have been incurred for permanent works, which, in some instances, have added considerably to the value of the property on which the loans have been made or charged. Thus, many of them, such, for instance, as those incurred in purchasing the undertakings of gas and water companies, represent an apparent, rather than a real, increase in the burdens imposed on the ratepayers, who formerly paid to the companies for gas and water the amounts which they are now called upon to pay to the Sanitary Authorities. Other loans, such as those for markets and private improvements, practically involve no burden on the general rates, and, in the case of loans incurred in carrying out improvement schemes under the Artizans' and Labourers' Dwellings Act, some of the money may be paid off by the sale of surplus lands. Granting all this, however, it behoves the Local Government Board to maintain a strict supervision over the growth of these loans, and especially over their application to the use for which they were intended. It is satisfactory to hear that this latter is being done, and that the result of the Board's investigations has been to prove that in the great majority of cases the loans have been properly expended.

During the session of 1878 no less than seventy-four provisional orders of the Board were confirmed by Parliament, none of the objects effected by these orders being attainable otherwise than by a provisional order, or the much more expensive and troublesome process of a local Act. The confirmation of only one order of the Board was refused by Parliament, though several underwent alteration in their passage through the Houses. An important responsibility is now imposed upon the Board, in having to make a report to Parliament on every local Bill promoted by Sanitary Authorities. During 1878 the number of these local Bills was sixty-three, which comprised, amongst others, the Thirlmere Bill of the Manchester Corporation.

It is gratifying to find that an increasing number of analysts are being appointed, forty-three more appointments being approved by the Board during 1878. The total number of appointments now in existence is 201, including five cases in which agreements have been entered into by Authorities with analysts of neighbouring districts. We shall take another opportunity of referring to the valuable

abstract contained in the volume of the reports of public analysts throughout the country.

From the report of Professor Frankland in his analysis of the waters supplied by the Metropolitan Water Companies, it appears that the waters of the Thames and the Lea were much more polluted during the year with organic matters than they were in 1877. Out of the 128,468,118 gallons which are upon the average consumed daily in the metropolis, Dr. Frankland states that 65,063,840 gallons were often much polluted with organic matter of animal origin, 55,311,360 gallons were occasionally so polluted, but much less intensely, and only 8,092,988 gallons were uniformly delivered in a pure and wholesome condition. Of companies drawing their supply from the Thames, the Chelsea Company delivered the best water and the Grand Junction the worst. Of water drawn from the Lea, that supplied by the New River Company was much the best. The Kent Company, which draws its supply from deep wells, has not the same difficulties as regards filtration as the other companies, and Dr. Frankland reports that the water furnished by this company has been uniformly wholesome throughout the year, and of most excellent quality for dietetic purposes. Colonel Bolton's report shows that a considerable advance was made during 1878 in extending a constant supply to the metropolis, nearly one fourth of the total number of houses supplied being now on constant service. The average quantity of water supplied daily for all purposes was 33.11 gallons per head of the estimated population and 237.4 gallons per house supplied. Colonel Bolton hits a blot to which we have often referred, when he remarks that, notwithstanding the effectual filtration and delivery of good water by the companies to their respective districts, the water frequently deteriorates in the cisterns of the consumers. The remedy for this is, of course, a constant supply; but until a constant supply is general it is absolutely necessary that the attention of householders should be given to the fittings and cleanliness of their cisterns, as well as to their house-drains and the water-pipes connected therewith, upon which depend, in a great measure, the purity and abundance of the domestic water-supply.

The other parts of the report (excepting the statistics relating to the medical department, which we shall deal with on the appearance of the promised report of the Medical Officer of the Board) seem to call for no comment at our hands. They consist chiefly of minute details of official performances of one kind or the other, all more or less intricate and uninteresting. On the whole, the report must be considered a satisfactory one, and if the operations of the Board were restricted to a much smaller field of action, and went more to the root of matters, the result would be even more gratifying.

The death-rate of Bath for August was 10.6 per 1,000, against 14.5 in the corresponding period of 1878. The deaths numbered 45, and the births 81.

NOTES OF THE MONTH.

THE RESIGNATION OF DR. CORNELIUS FOX.

A flood of new light is thrown upon the causes of the refusal of the Billericay Rural Authority to re-appoint Dr. Cornelius Fox by the publication of a report by Dr. Thorne Thorne, of the Local Government Board, on a place in the Authority's district called Wickford. In July 1874, Dr. Fox made a report on the insanitary state of this village, pointing out its defective drainage and privy accommodation, and suggesting simple remedies. Nothing was of course done, and in September 1878 a serious outbreak of diphtheria broke out in the village in intimate relation with the unwholesome conditions prevailing there. Dr. Fox reported this outbreak to the Rural Authority, urging the adoption of the recommendations made by him in 1874, and sent a copy of his report to the Local Government Board in accordance with official instructions. A strong letter came down from Whitehall about the Authority's delay, and there can be no sort of doubt that this was the real reason of the refusal of the latter to re-appoint Dr. Fox, the plea of economy being a mere subterfuge. Dr. Thorne's inspection was unfortunately not made until the question of Dr. Fox's re-appointment had been settled, and the Local Government Board had declined to interfere in the matter. Dr. Thorne's report corroborates in every respect that made by Dr. Fox in 1874, but it is difficult to see for what purpose the inspection was made, except to show that, however much a medical officer of health may be in the right, the Local Government Board do not care to defend him against the displeasure of sanitary authorities who quarrel with him for having done his duty.

MASTERS AND SERVANTS.

Dr. Ogle, in a report to one of his sanitary authorities, draws attention to a matter of very grave importance in speaking of the almost universal practice of masters and mistresses, when a servant falls ill with fever or other infectious ailment, to send her home to her family, most usually living in a small cottage, where there is no proper space for the additional inmate. When the disease is typhoid fever, as in the case of the epidemic which prompts Dr. Ogle's remarks, it is very doubtful whether there is any illegality in this; for the mode in which the disease is transmitted from person to person is not such as to make Section 126 of the Public Health Act apparently applicable to it. If, however, the practice be not illegal, it is a very cruel and a very dangerous one. No less than seven outbreaks of typhoid fever are stated by Dr. Ogle to have originated in this way within his own experience. In the last of the series, a girl in service at a distance out of the district fell ill with typhoid contracted in her master's house, where there were other cases of the disease. Notwithstanding that she was very ill, and ought not to be removed, she was sent home to her own village to a cottage utterly unfit to receive such an additional inmate. Here she died. While she lay ill, her infectious excreta were thrown into the common privy, which on one side was so close to the house, there being no spare ground, that in hot weather the stink was perceptible in the dwelling, and on the other side leaked from its uncemented pit into a ditch which supplied the drinking-water

for this and other cottages. The natural result followed—a general outbreak of typhoid in the village, and three fatal cases. This outbreak, with its fatal results, would not have occurred but for two things: first, the highly improper removal of the girl, and, secondly, the condition of the privies and the water-supply at the place. The girl brought the seed, but the place was prepared for its reception and propagation, and had it not been so, the disease would have died out with the girl herself. Doubtless it is often difficult to know what to do when a servant falls ill with typhoid fever or other infectious disease; but this difficulty is one of the reasons which makes the establishment of hospitals for the reception of non-pauper cases of illness so urgent a necessity.

THE REGISTRATION OF INFECTIOUS DISEASE.

Information has reached us of a very serious outbreak of typhus fever at Jarrow, which has already attacked some seventy persons, and threatens to become more extensive. The regulation that is in force in the borough, requiring medical practitioners to forward to the Sanitary Authority information of cases of infectious disease, has enabled the Medical Officer of Health to trace with great certainty the course of the disease, and the origin of the various attacks. There seems to be little doubt that this regulation has been the means of saving the town from a wide-spread epidemic of the disease. In houses where ordinary sanitary precautions were possible, they have been from the first enforced, and the infection has never spread. But the disease cannot so easily be stamped out, in the lowest and most crowded quarters, in the absence of the infectious hospital that has so long been under consideration, and is still being haggled about. But even there, in spite of difficulties, the spread of the disease would appear to have been greatly checked. In view of this epidemic, it is to be hoped that the Town Council will soon come to a decision about the provision of hospital accommodation for the borough, for they must see how powerless they are to prevent the extension of the disease without means of isolation. As Mr. Spear observes, every fresh case is a source of added danger, and the misfortune is that the mischief is not confined to Jarrow. Already cases of the disease have been conveyed to South Shields, Newcastle, and Hebburn, while at Carlisle quite a smart outbreak of typhus has occurred, the disease, it being reported, having been conveyed from Jarrow. Thus, the Sanitary Authority, by its administration, is powerful for good or evil, far beyond the limits of its own jurisdiction. A striking proof of the ease with which the epidemic might have been avoided, if the borough had had a hospital, is afforded by the fact that nearly all of some sixty to seventy cases can be traced distinctly to one first case, which might and which ought to have been removed. One case, in particular, points a moral in this connexion. An apprentice at a pawnbroker's shop died of typhus; and Mr. Spear subsequently found at this shop, within fourteen days of the lad's leaving his work, no less than fourteen articles from different infected houses had been pawned. Further inquiries at other pawnshops brought to light many other similar instances. Of course, these people may be summoned before the justices, but it is a question whether it would be of any avail. They are poverty-stricken, and they can easily evade the law. The only practicable remedy for such shocking occurrences is the provision of a hospital, which ought no longer to be delayed.

ENTERIC FEVER AND POLLUTED WATER.

An outbreak of enteric fever of a somewhat alarming kind has broken out at the female Orphans' Home in Jersey, an institution that contains about 140 girls of various ages. We learn from an authentic source that the family at the orphanage have, as a rule, enjoyed excellent health, and did so up to May 18, when several were suffering from what was declared to be gastric fever. On searching for the cause, it was attributed to the water from a well which has been in existence and supplied the wants of the locality for at least a century. But on additions and changes being made on the property in 1862, a cesspool about six or seven feet deep in dry rubble stone was made some fifty or sixty feet from the well, in red clay; this received the sewage from water-closets, and to this cesspool is attributed the pollution of the water, which in colour and taste betrayed no sign of impurity, but, on being tested, was proved to be impure. The particulars of this analysis, by Mr. Morgan, will be found in the *Chemical News* of August 29. The closing of the well put an end to the cases of typhoid, which seems to confirm the truth of the conclusion arrived at.

SANITARY REGISTERS.

At the last monthly meeting of the Scarborough Town Council, a Report of the Sanitary Committee, with reference to the proposal to establish a sanitary register, was adopted. The Committee reported that they were of opinion that it was desirable that a permanent register should be kept, showing the following particulars in reference to every dwelling-house erected and to be erected in the borough, viz., number, date of inspection, situation of premises, owner, occupier, rooms—(*a*) living rooms, (*b*) bedrooms; inmates—(*a*) family, (*b*) lodgers; privy or watercloset; ashpit; nature of water-supply; drainage; ventilation and general condition of premises; existence of any special source of actual or possible nuisance; remarks of medical officer; and additional observations. Having regard to the special knowledge required in the preparation and maintenance of the proposed register, and the great desirability of securing thorough supervision over the whole of the sanitary department, the committee recommended the council should appoint, as sanitary inspector, a competent person, having a thorough knowledge of sanitary matters. A permanent record of the kind suggested would, undoubtedly, greatly facilitate the carrying out of the provisions of the Public Health and other Acts, with reference to the detection and suppression of nuisances, and would prove invaluable to sanitary officials in the performance of their duties. No difficulty need be apprehended in obtaining all the particulars required, and revising the register from time to time; and its maintenance would also ensure a thorough compliance with the obligation imposed by the Public Health Act, 1875, upon local authorities to make, from time to time, an inspection of the whole of their districts. Of course, the register would not supersede or dispense with the necessity for the usual record of the proceedings taken from time to time for the suppression of ascertained nuisances, or the periodical reports of work done in the nuisance inspection department. The compilation of such a register ought, in our opinion, to be made compulsory on every local authority. Without it, it is impossible to proceed satisfactorily on any rational system of sanitary improvement. Indeed,

it seems to us to be an indispensable preliminary to sanitary action, and we trust the example of the Scarborough Town Council will be extensively followed.

TYPHUS IN ST. GILES'S.

With reference to the reported existence of typhus fever in St. Giles's, we are informed by Mr. Lovett, the energetic medical officer of health for the district, that two cases of typhus fever, from Bear Yard and Orange Court, Drury Lane, respectively, have been sent to King's College Hospital. Owing, however, to the patients having been moving about from place to place, in London and elsewhere, it is not easy to determine where they contracted the disease. Lincoln and Orange Courts, in both of which they were located for some time, are, however, in an undoubtedly insanitary condition, and form part of the 'Great Wild Street area', which was condemned by the medical officer of health for St. Giles's district in December 1875, reported on by him to the Metropolitan Board of Works, and now being dealt with by that authority.

ALLEGED POISONING OF A FAMILY AT BANSTEAD BY IMPURE WATER.

With reference to the alleged wholesale disposal of a family, we are informed, on unimpeachable authority, that the only person of the family at Banstead, stated to have been poisoned by drinking polluted water, was a child suffering from diphtheria and purpura. The diphtheria is supposed to have been caused by the emanation of sewage gas, as the waste pipe from the sink led directly into a cesspool; and the parents stated that the odour was most offensive; so much so, that a cork had always to be kept in the sink-hole, to prevent the smell coming into the house, and there was no stink-trap. With reference to the bad water, it was rain-water, and stated by the occupier of the house to contain insects. This has since been remedied, as water has been laid on, and the sink and cesspool seen to. Three other children were attacked with measles, which was prevalent in the village at the time, but they developed no diphtheritic symptoms. Neither the father or mother were affected.

METEOROLOGY OF SEPTEMBER.

THE weather during September was marked by the same general features as in the preceding summer months. The temperature was almost continuously below the average; rain was frequent, and excessively abundant; and the amount of recorded sunshine was below the average. The following is a summary of the meteorological observations at the Royal Observatory, Greenwich, published by the Registrar-General in his weekly return.

The mean reading of the barometer during September was 29.80 inches, and was almost identical with the average reading for the corresponding month in 37 years. The mean reading was above 30 inches on five days, and below 29½ inches on five days of the month. The highest reading recorded during the month was 30.32 inches on the 1st, and the lowest was 29.32 inches on 23rd, when three-quarters of an inch of rain was measured.

The mean temperature of the air during the month was 56°.3, and was but 0°.2 below the average mean temperature during the corresponding month in 100 years. This mean scarcely differed from that of September 1878, but exceeded by 3°.4 the mean of September 1877. The mean temperature showed an excess on ten days during last month, the warmest day being 13th, when it was 60°.3 and 2°.5 above the average; the mean was above the average during the five consecutive days 16th to 20th, inclusive. The mean was below the average during the other twenty days of the month, the coldest days being 24th and 25th, when the mean was only 51°.7 and 50°.0, showing a deficiency of 4°.2 and 5°.8 respectively. The mean was continuously below the average during the week ending 27th, and averaged only 53°.1, showing a deficiency of 2°.8.

Rain was measured on fourteen of the thirty days of September to the aggregate amount of 2.8 inches; the average rainfall for September in 61 years was 2.4 inches. The rainfall of last month was therefore 0.4 inches above the average. During the 19 years 1861-79, the September rainfall has ranged from 3.9 inches in 1866, to 0.8 of an inch in 1878. The average rainfall at the Royal Observatory, Greenwich, in 61 years was 25.3 inches per annum. During the nine months ending September last, 29.0 inches of rain were measured on 152 of the 274 days in that period. Thus, rain was measured on more than half the days of the first nine months of this year, and the aggregate amount measured was 3.7 inches above the average amount for the whole year, and 10.8 inches in excess of the average amount for the nine months.

Excepting six days ending 19th, when it blew from the north-east, the general direction of the wind during the month was south-westerly. The force of the wind was above the average of 16 years on eighteen, and below the average on twelve, days of the month.

During September the sun was above the horizon during 376.9 hours, and 116.5 hours of bright sunshine were recorded, which was equal to 30.9 per cent. of its possible duration. The sunniest days were 1st and 3rd, when 11.3 and 11.0 hours of bright sunshine were recorded out of a possible 13.5 and 13.4 hours respectively. The recorded amount of sunshine in September 1877 and September 1878 was 105.6 and 127.5 hours; so that the sunshine last month exceeded that in the corresponding month of 1877, but was 11 hours less than that in September 1878. In the first nine months of this year only 844 hours of bright sunshine were recorded, against 1,092 in the corresponding period of 1878, showing a deficiency since the beginning of the year of no less than 248 hours of sunshine.

THE PUBLIC HEALTH

IN THE FOUR WEEKS ENDING 27TH SEPT. 1879.

The favourable condition of the public health during July and August indicated by the Registrar-General's mortality statistics, was almost maintained during September. In twenty of the largest English towns, containing nearly a third of the entire population of England and Wales, 20,555 births and 10,765 deaths were registered during the four weeks ending 27th September. The births exceeded by 479, whereas the deaths were 852 below, the numbers returned in the corresponding four weeks of 1878. The deaths included 2,183 which were referred to the seven principal zymotic diseases, against 2,544 in the corresponding period of last year; 1,003 resulted from diarrhœa, 459 from scarlet fever, 250

from whooping-cough, 215 from measles, 174 from fever (including typhus, enteric or typhoid, and simple), 69 from diphtheria, and 13 from small-pox. Compared with the numbers recorded in the four weeks of September 1878, the fatal cases of measles showed a marked increase last month, and those of diphtheria were slightly more numerous; those of each of the five other zymotic diseases showed a decline, which was proportionally largest in the deaths referred to fever and diarrhœa. The 2,183 deaths registered from these seven diseases during the four weeks of September were equal to an annual rate of 3.9 per 1,000 persons estimated to be living in the twenty towns, against 4.6 in the corresponding four weeks of 1878. The zymotic death-rate during last month did not exceed 1.9 in Portsmouth, 2.0 in Bristol, 2.1 in Oldham, and 2.3 in Bradford, Wolverhampton, and Plymouth; it ranged upwards in the other towns to 4.6 in Leeds, 4.9 in Leicester, 4.9 in Sunderland, 5.1 in Salford, and was highest, 6.0 in Liverpool. The five last-mentioned high zymotic death-rates during September were mainly due to excessive fatality of diarrhœa. Scarlet fever was, however, more or less fatally prevalent in Sunderland, Leeds, Salford, and Liverpool. Measles continued excessively prevalent in London during September, and the fatal cases were also numerous in Liverpool. Scarlet fever was, however, somewhat more fatal in the provincial towns than in London. Of the sixty-nine deaths referred to diphtheria, forty-four occurred in London and but twenty-five in the nineteen provincial towns, which have a slightly larger aggregate population than the metropolis. The 250 deaths from whooping-cough in the twenty towns showed a decline of thirty-four from the number in the preceding four weeks, and showed a slightly higher death-rate in London than in the nineteen other towns. Fever, principally enteric or typhoid, caused 174 deaths in the twenty towns during the four weeks under notice, of which 104 occurred in London and but seventy in the nineteen provincial towns; in the corresponding four weeks of 1878 the deaths referred to fever in the twenty towns were 309. The mortality from fever last month was, therefore, 44 per cent. below that recorded in September 1878, and was certainly considerably lower than in any previous corresponding month for which records exist. Small-pox caused thirteen more deaths in London last month (against nineteen and twenty in the two preceding four weeks), whereas no fatal case occurred in any of the nineteen large provincial towns. The number of small-pox patients in the Metropolitan Asylum Hospitals, which was 111 on 30th August, declined steadily to 70 on 27th September. The average weekly number of small-pox cases admitted to these hospitals, which had been twenty-one in July and twenty-five in August, declined to seven during the four weeks of September.

The fatality of diarrhœa, principally infantile, was proportionally much larger during September than it had been in July or August. The fatal cases of this disease, which had been 952 in the four weeks of August, rose to 1,003 in the following four weeks of September, although the fatality of diarrhœa is usually much lower in September than it is either in July or August. The 1,003 deaths from diarrhœa in these twenty towns were, however, 232 less than the number returned in the corresponding period of 1878. The annual death-rate from diarrhœa during September was equal to 1.8 per 1,000 in the twenty towns, against 0.4 and 1.7 in July and August respectively. The annual death-rate from diarrhœa in these twenty towns averaged but 1.2 per 1,000 in the three months of last quarter, against 2.3 and 4.2 in the corresponding periods of 1877 and 1878. In London during last month the death-rate from diarrhœa was equal to 1.6 per 1,000, and to 1.9 in the nineteen large provincial towns; in the whole quarter, however, London suffered from a greater diarrhœa fatality than did the provincial towns, which is most unusual. The annual death-rate from diarrhœa in London during last quarter was equal to 1.3 per 1,000, which was, however, considerably lower than it has been in any corresponding quarter since 1860 and 1862, when it was equal to 1.1 and 1.3 per 1,000 respectively. The excessive death-rates from diarrhœa recorded during last quarter in some of the Continental and in most of the American cities were in striking contrast with the exceptionally low death-rates from this disease recorded in our principal English towns.

The annual rate of mortality from all causes per 1,000 of the nearly seven and a-half millions of persons estimated to be living in the twenty towns, which had been so low as 17.7 and 18.4 during July and August, further rose during the four weeks of September to 19.0. In the corresponding four weeks of the three years 1876-7-8, the death-rate in those towns averaged 20.0, 19.6, and 20.0 per 1,000 respectively. It is evident that the English death-rate in September, judged by the mortality statistics of the twenty largest towns, continued remarkably low, although it showed an increase upon the low rates in July and August. If the death-rate from all causes in the whole of England and Wales bore the usual proportion during last quarter to the death-rate in the twenty large towns, we may venture to estimate that the national death-rate during the three months ending September last scarcely exceeded 16 per 1,000, whereas the lowest death-rate in England and Wales in the third, or summer, quarter of the year, since civil registration was established in 1837, was 17.2 in the cold and wet summer of 1860. The summer of 1879 has not been so cold as that of 1860, but a far heavier rainfall has been measured.

The lowest annual rate of mortality during September in the twenty large English towns, was 14.4 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Oldham, 15.8; Bradford, 16.0; Sheffield, 16.2; Bristol, 16.8; Birmingham, 16.9; Wolverhampton, 17.0; Hull, 17.6; Plymouth, 17.7; Leeds, 18.3; Norwich, 18.5; London, 18.8; Brighton, 19.0; Leicester, 19.5; Newcastle-upon-Tyne, 20.2; Salford, 20.3; Nottingham, 20.4; Manchester, 21.1; Sunderland, 21.3; and the highest rate during the month 25.5 in the borough of Liverpool. The death-rate during the month, which, as has been stated, was equal to 18.8 in London, averaged 19.2 in the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London. The London death-rate in September was slightly lower than that in August, whereas it showed a marked increase in the provincial towns. The marked excess in the Liverpool death-rate was mainly due to the fatality of the principal zymotic diseases, especially of scarlet fever, measles, and diarrhœa.

It appears from the metropolitan returns that 672 deaths were referred to the various diseases of the respiratory organs (not including phthisis) in London during the four weeks ending the 27th ult., against 634 in the four preceding weeks of August. These 672 deaths exceeded the corrected average number

for the corresponding week in the past ten years by fifteen, and were equal to an annual rate of 2.4 per 1,000 of the estimated population. The deaths referred to phthisis in London were 549, against 533 in August, and equal to an annual rate of 2.0. Thus the rate of mortality from diseases of the respiratory organs and phthisis was 4.4 per 1,000; in Liverpool the rate from these diseases was 5.3, and in Salford to 4.6 per 1,000. It is much to be regretted that this information is not available for each of the twenty large towns, as it would probably frequently afford an explanation of the variations of death-rates, which are not always due to differences of zymotic fatality.

In inner or registration London the death-rate from all causes in September was, as we have seen, equal to 18.8, and from the seven zymotic diseases to 3.9 per 1,000 of the population. In the outer ring of suburban districts around London (having a population estimated at little short of a million persons), the annual death-rate from all causes during the month did not exceed 14.6, and the zymotic rate was but 2.6 per 1,000.

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Four Weeks ending Sept. 27th, 1879.				
		Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000.	
					All Causes.	7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns . .	7,383,999	20,555	10,765	2183	19.0	3.9
19 Provincial Towns .	3,763,131	10,469	5,551	1104	19.2	3.8
London (Reg. Gen.) .	3,620,868	10,086	5,214	1079	18.8	3.9
Brighton (borough) .	105,608	255	154	32	19.0	4.0
Portsmouth (borough) .	131,821	332	145	19	14.4	1.9
Norwich (borough) . .	85,222	210	121	19	18.5	2.9
Plymouth (borough). .	74,303	190	101	13	17.7	2.3
Bristol (city) . . .	209,947	585	271	32	16.8	2.0
Wolverhampton (borough)	75,100	203	98	13	17.0	2.3
Birmingham (borough) .	388,884	1,155	505	91	16.9	3.1
Leicester (borough) . .	125,622	342	188	47	19.5	4.9
Nottingham (borough) .	169,396	475	265	54	20.4	4.2
Liverpool (borough) .	538,338	1,597	2,052	246	25.5	6.0
Manchester (city) . .	361,819	992	585	117	21.1	4.2
Salford (borough) . .	177,849	548	277	70	20.3	5.1
Oldham (borough) . .	111,318	298	135	18	15.8	2.1
Bradford (borough) . .	191,046	445	235	33	16.0	2.3
Leeds (borough) . .	311,860	861	437	109	18.3	4.6
Sheffield (borough) . .	297,138	796	370	82	16.2	3.6
Hull (borough) . .	146,347	432	198	30	17.6	2.7
Sunderland (borough) .	114,575	323	187	43	21.3	4.9
Newcastle-upon-Tyne (borough) . . .	146,948	430	227	36	20.2	3.2

HEALTH OF OTHER URBAN SANITARY DISTRICTS IN SEPTEMBER.

We are enabled to report a further satisfactory increase in the number of medical officers of health who have shown, in the most effectual manner, their willingness to co-operate in our endeavour to organise and publish in these columns uniform monthly vital statistics for as many as possible of the urban sanitary districts of England and Wales. The following table contains these uniform statistics for 67 of such sanitary districts for September, against 36 for July, and 55 for August. The estimated population of these 68 urban sanitary districts situated in all parts of the country in the middle of this year is very nearly two millions of persons.

Some of the districts from which we publish these returns are small, but the facts relating to them are none the less valuable; indeed, in a sense they are more so, inasmuch as the Registrar-General has long been accustomed to publish mortality statistics for seventy of the largest English and Welsh towns, while there has hitherto been no available source for obtaining trustworthy information relating to the smaller towns. It has been urged that calculated rates for such small populations are worse than useless, and likely to lead to fallacious conclusions. We have no fear that our statistics can be anything but useful both to medical officers of health and to all those taking a real interest in sanitary matters. Our statistics are of two kinds—the actual recorded facts for each sanitary district, and the calculated rates reduced to the uniform standard of an annual rate to 1,000 persons living for comparative purposes. However small the districts, the facts relating to the causes of death, whether showing the absence or presence of fatal zymotic disease, have a distinct value as affording evidence of sanitary condition. Moreover, it is scarcely necessary to guard our readers against using the calculated monthly rates for small sanitary districts as the basis of conclusions as to comparative sanitary condition.

On the last day of September, or the first of October, post-cards asking for the necessary information relating to September were addressed to 110 medical officers of health, 55 of whom had furnished information for August; 48 returns were received from previous contributors, and 19 from medical officers of health who now co-operate for the first time. We regret to say that we have not received returns for September from 9 urban sanitary districts which appeared in our list for August; these include the important towns of Croydon, Dewsbury, Barnsley, Glossop, and Boston. Among those sanitary districts for which we now publish returns which did not appear in our August list may be mentioned Bath, Leamington, Widnes, Reading, and Congleton. We have not yet received any reply to a considerable number of the circulars sent out to medical officers of health containing a request for co-operation in this matter. We have, therefore, reason to hope for a further increase to our list of contributing districts in subsequent months.

The annual birth-rate in 62 of the sanitary districts appearing in our list for September averaged 34.6 per 1,000 during that month, against 34.0 in August. The average birth-rate in September in the twenty large towns dealt with in the Registrar-General's weekly return was 36.3. The medical officers of health of five of the districts were unable to supply the number of births registered during the month. It may be hoped, in order to secure greater uniformity, and to afford the means for measuring the rate of infant mortality, that these medical officers of health will obtain from the local registrars the numbers of births registered within their districts. The annual death-rate in the whole of the 67 sanitary districts averaged only 15.8 per 1,000, and was 3.2 below the average rate in the twenty larger English towns. The death-rate in these 67 sanitary districts during September but slightly exceeded the rate in the 55 districts furnishing returns for August, which was only 15.1 per 1000. The annual rates during last month were remarkably low, and below 10 per 1,000, in Bilston, Bromsgrove, Ilfracombe, Leamington, Lytham, Penzance, Teignmouth, and Withington. It ranged upwards in the other towns to 20.6 in Derby, 20.7 in Preston, 21.2 in Rochester, 21.2 in York, 21.3 in Toxteth Park,

| | | |

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Glossop	17,072	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Rhodes.
Gorton	30,000	104	41	21	4	5	1	9	1	11	—	—	—	4	2	5	7	2	1	—	45.2	17.8	4.8	3.0	202	R. E. Hammond.
Guildford	9,996	34	10	2	2	—	—	1	5	—	—	—	—	—	—	—	2	—	1	—	41.4	12.2	0.0	2.4	59	J. Morton, M.B.
Halifax	71,500	174	107	29	14	*	*	*	20	10	—	1	5	—	—	2	2	22	15	2	9	29.6	18.2	1.7	3.7	167	D. Ainley.
Hanley	48,091	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. S. Walker, M.D.
Hindley	12,000	54	22	8	4	1	1	4	4	1	—	—	1	—	—	—	—	3	5	1	—	54.8	22.3	1.0	3.0	148	J. G. Brayton.
Ilfracombe	5,300	28	4	1	—	—	—	—	3	—	—	—	—	—	—	—	—	1	—	—	—	64.2	9.2	0.0	0.2	36	E. J. Slade-King, M.D.
Jarrow	22,000	75	25	11	1	2	1	6	4	5	—	—	1	—	—	1	3	3	1	—	—	44.4	14.8	3.0	1.8	147	J. Spear.
Keighley	27,000	50	33	5	5	2	2	7	12	4	—	3	1	—	—	—	—	5	1	—	—	22.5	14.9	1.8	2.3	100	A. Roberts.
Kidderminster ...	22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	D. Corbet.
Leamington	23,814	48	18	1	1	2	2	6	6	2	—	—	2	—	—	—	—	—	1	—	2	24.5	9.2	1.0	0.0	21	J. S. Baly.
Leigh	20,400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Hall.
Littlehampton	4,032	13	5	1	—	2	—	—	2	—	—	—	—	—	—	—	—	1	—	1	—	39.3	15.1	0.0	3.0	77	C. Kelly, M.D.
Longton	23,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Weaver, M.D.
Lytham	5,000	11	4	1	—	—	1	1	1	—	—	—	—	—	—	—	—	2	1	1	—	26.8	9.7	0.0	4.9	91	W. E. Pountney, M.B.
Maidenhead	8,052	17	11	1	1	—	—	5	4	1	—	—	—	—	1	—	—	—	2	—	3	25.7	16.6	1.5	0.0	59	W. T. Woodforde, M.D.
Merthyr Tydfil ...	50,350	132	63	12	5	5	5	21	15	2	—	—	—	—	—	2	—	9	11	1	—	31.9	15.2	0.5	2.2	91	T. J. Dyke.
Newbury	8,097	27	12	1	1	1	—	3	6	1	—	—	—	—	—	—	1	—	1	3	1	40.5	18.0	1.5	0.0	37	W. T. Woodforde, M.D.
Newcastle-under-Lyme	18,000	45	19	7	2	1	—	7	2	2	—	—	—	1	—	—	1	3	2	1	1	30.4	12.8	1.4	2.0	156	St. J. Edwards, M.D.
Oldham	111,318	298	135	40	20	5	8	39	23	19	—	1	4	1	2	1	10	26	16	6	12	34.9	15.8	2.2	3.0	134	J. M. Sutton, M.D.
Oakworth	5,800	14	5	—	1	—	—	1	3	1	—	—	1	—	—	—	—	—	—	—	—	29.4	10.5	2.1	0.0	—	F. W. Barry, M.D.
Penzance	11,000	25	8	—	—	—	1	2	5	—	—	—	—	—	—	—	—	2	1	—	—	27.6	8.8	0.0	2.2	—	J. Symons (Deputy).
Preston	87,600	261	149	58	38	7	7	24	15	39	—	3	9	1	—	1	25	27	11	3	3	38.8	22.2	5.8	4.3	222	H. O. Pilkington.
Reading	40,000	114	46	13	3	5	2	14	9	4	—	—	1	1	—	—	2	2	4	2	7	34.7	14.0	1.2	0.6	114	J. Shea, M.D.
Redditch	9,686	35	31	8	8	—	2	11	2	7	—	5	—	—	1	—	1	2	4	—	—	44.0	38.9	8.8	2.5	229	H. M. Page.
Rochdale	71,200	191	88	23	10	3	6	25	21	11	—	1	2	1	—	—	6	20	8	3	—	32.6	15.0	1.9	3.4	120	J. M. Wilson, M.B.
Rochester	18,352	64	32	6	5	2	3	8	8	1	—	1	—	—	—	—	—	6	3	1	6	42.4	21.2	0.7	4.0	94	J. S. Knight, M.D.
Rotherham	31,631	95	36	*	*	*	*	*	*	5	—	—	1	—	1	—	3	—	—	—	5	36.5	13.8	1.9	0.0	*	J. Hardwicke.
Rowley Regis	27,000	91	33	19	7	1	1	1	4	3	—	—	—	—	—	—	3	—	—	2	—	41.0	14.9	1.4	0.0	209	H. R. Ker.
Skipton	9,100	25	12	1	3	—	—	4	4	2	—	1	—	—	—	—	1	2	—	1	1	35.8	17.2	2.9	2.9	40	F. W. Barry, M.D.
Smethwick	21,000	69	21	11	1	1	—	5	3	3	—	—	—	—	—	—	3	4	2	—	—	40.0	12.2	1.7	2.3	159	W. Sutton.
South Shields	61,000	173	73	22	17	10	1	13	10	25	—	1	15	—	2	2	5	13	5	1	5	37.0	15.6	5.3	2.8	127	J. Spear.
Stalybridge	23,124	60	27	12	6	2	1	1	5	5	—	1	2	—	—	—	2	10	4	1	—	31.6	14.2	2.6	5.3	200	F. J. Roberts-Dudley
Swansea	65,000	201	116	22	18	17	17	32	10	33	—	—	4	—	—	27	2	7	17	1	7	37.6	21.7	6.2	1.3	109	E. Davies.
Teignmouth	7,000	15	5	2	—	—	—	1	2	1	—	—	—	—	—	—	1	—	1	—	—	26.1	8.7	1.7	0.0	133	W. C. Lake, M.D.
Torquay	25,000	*	23	7	—	1	—	7	8	—	—	—	—	—	—	—	—	3	2	2	1	*	11.2	0.0	1.5	*	P. Q. Karkeek.
Toxteth Park	8,000	26	14	2	3	1	2	5	1	1	—	—	—	—	—	—	1	—	—	—	—	39.5	21.3	1.5	0.0	77	R. W. Pendleton.
Warrington	37,000	154	46	11	9	2	6	8	10	8	—	1	3	—	1	—	3	4	3	2	8	50.6	15.1	2.6	1.3	71	G. W. Joseph.
Wednesbury	26,000	72	32	13	5	2	1	2	9	3	—	—	—	—	—	—	3	3	2	—	—	36.1	16.0	1.5	1.5	181	J. C. Garman.
West Derby	32,263	95	50	7	9	5	5	15	9	9	—	—	6	—	—	—	3	2	5	—	2	35.8	18.9	3.4	0.8	74	W. Carter, M.B.
Widnes	22,000	91	33	7	14	5	—	5	2	4	—	—	3	—	—	—	1	5	2	1	—	50.3	18.3	2.2	2.8	77	W. Cooper.
Withington	15,000	34	11	2	—	2	1	5	1	2	—	—	1	—	—	—	1	1	—	2	—	27.6	8.9	1.6	0.8	59	T. C. Railton, M.B.
Worthing	9,365	23	9	1	—	—	1	3	4	—	—	—	—	—	—	—	—	—	1	2	1	29.9	11.7	0.0	0.0	43	C. Kelly, M.D.
York	46,436	109	81	29	4	8	2	24	14	17	—	—	4	—	—	—	13	7	7	4	3	28.6	21.2	4.5	1.8	266	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF SEPTEMBER 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Deaths under one year of age to 1,000 births	Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Abingdon	6,007	21	6	2	1	1	—	1	1	—						—		—	—	2	—	42.5	12.1	0.0	0.0	95	W. T. Woodforde, M.D.
Accrington	30,000	—	—	—	—	—	—	—	—	—						—		—	—	—	—	—	—	—	—	—	J. Ewart.
Altrincham	11,000	24	11	6	2	—	1	—	2	2						—	2	1	—	—	—	26.5	12.2	2.2	1.1	250	G. H. Atwell.
Ashford	10,000	—	—	—	—	—	—	—	—	—						—	—	—	—	—	—	—	—	—	—	—	W. H. Coke.
Aston Manor	51,408	171	65	21	16	2	1	12	13	12	—	—	2	4	2	—	4	14	3	1	—	40.5	15.4	2.8	3.3	123	H. May.
Bangor	7,820	*	15	5	1	1	—	3	5	—						—	—	2	—	—	—	*	23.3	0.0	3.1	*	H. Rees.
Barnsley	30,000	—	—	—	—	—	—	—	—	—						—	—	—	—	—	—	—	—	—	—	—	M. T. Sadler, M.D.
Bath	52,582	105	70	*	*	1	5	19	27	7	—	4	1	—	—	1	1	5	7	—	21	24.3	16.2	1.6	1.2	*	A. B. Brabazon, M.D.
Batley	28,721	85	36	11	10	1	2	8	4	4						2	2	9	5	—	—	36.0	15.2	1.7	3.8	129	W. Bayldon.
Belper	10,000	*	23	3	2	4	—	5	9	4	—	—	3	—	—	1	—	4	1	—	6	*	28.0	4.9	4.9	*	R. G. Allen.
Bilston	24,188	*	17	5	2	3	1	2	4	4	—	1	—	—	—	1	2	5	1	1	—	*	8.6	2.0	2.5	*	W. M. Hancox.
Bingley	9,000	25	9	3	1	—	1	1	3	1						1		2	—	—	—	33.8	12.2	1.4	2.7	120	J. W. Craig, M.D.
Bolton	105,000	303	128	43	16	5	9	25	30	26	—	4	2	1	1	1	17	19	10	2	—	37.6	15.9	3.2	2.4	142	E. Sergeant.
Bootle-cum-Linacre ...	25,500	88	37	9	11	2	3	5	7	7			1	—	—	—	6	8	4	3	1	42.0	17.7	3.3	3.8	102	R. J. Sprakeling.
Boston	15,000	—	—	—	—	—	—	—	—	—						—	—	—	—	—	—	—	—	—	—	—	W. Clegg.
Bridgnorth	6,000	14	5	1	—	—	—	1	3	1						—	1	—	—	—	—	28.4	10.1	2.0	0.0	71	A. Mathias.
Bridport	8,080	26	18	1	10	—	—	5	2	9	—	9	—	—	—	—	—	1	2	—	—	39.2	27.1	13.6	1.5	38	G. M. Evans.
Bromsgrove	8,782	23	4	1	—	—	1	1	1	—						—	—	—	—	—	—	31.9	5.5	0.0	0.0	43	C. Carey.
Burslem	28,763	99	34	12	1	—	1	14	6	7					1	2	4	7	2	—	—	41.9	14.4	3.0	3.0	121	J. M. Taylor.
Bury St. Edmunds ...	15,600	41	14	4	2	1	1	2	4	1			1			—	—	1	1	—	—	32.0	10.9	0.8	0.8	98	F. W. Clarke.
Cambridge	34,000	74	38	10	3	1	—	12	12	4			1	—	—	1	2	4	5	2	3	26.5	13.6	1.4	1.4	135	B. Anningson, M.D.
Canterbury	20,692	42	24	4	2	—	1	7	10	1						—	1	7	—	2	6	24.7	14.1	0.6	4.1	95	F. Wacher.
Cardiff	80,150	247	91	29	6	5	7	32	12	5	—	—	2	1	—	1	1	11	8	11	18	37.7	13.9	0.8	1.7	117	H. J. Paine, M.D.
Carnarvon	10,299	23	23	4	4	1	1	5	8	—						—	—	7	4	—	—	27.2	27.2	0.0	8.3	174	H. Rees.
Cheltenham	45,000	77	46	2	1	1	5	18	19	1						—	1	4	6	1	5	20.8	12.4	0.3	1.1	26	T. Wright, M.D.
Colchester	28,633	69	32	5	3	3	2	7	12	1						—	1	10	5	1	4	29.3	13.6	0.4	4.2	72	E. Waylen.
Congleton	12,000	29	18	3	1	—	3	4	7	—						—	—	1	6	—	—	29.4	18.3	0.0	1.0	103	P. M. Davidson.
Coseley	23,000	81	27	12	4	—	*	*	*	1						1	—	1	—	—	—	42.9	14.3	0.5	0.5	148	J. Eagleton.
Coventry	41,000	146	57	19	3	2	5	14	14	2				1	—	1	—	9	8	—	2	43.3	16.9	0.6	2.7	130	M. A. Fenton, M.D.
Croydon	69,500	—	—	—	—	—	—	—	—	—						—	—	—	—	—	—	—	—	—	—	—	C. W. Philpot, M.D.
Derby	80,385	234	136	35	25	*	*	*	28	27	—	—	19	—	2	1	5	17	11	6	17	35.4	20.6	4.1	2.6	150	W. Iliffe.
Devonport	50,000	*	64	8	11	5	5	14	21	9	—	8	—	—	—	1	—	6	8	—	2	*	15.6	2.2	1.5	*	J. May, junr.
Dewsbury	31,000	—	—	—	—	—	—	—	—	—						—	—	—	—	—	—	—	—	—	—	—	W. F. Watts.
Dover	33,028	87	27	4	2	—	—	12	9	3	—	1	—	—	—	1	1	2	5	2	6	32.0	9.9	1.1	0.7	46	M. K. Robinson, M.D.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Glossop	17,072	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Rhodes.
Gorton	30,000	104	41	21	4	5	1	9	1	11	—	—	—	—	4	2	5	7	2	1	—	45.2	17.8	4.8	3.0	202	R. E. Hammond.
Guildford	9,996	34	10	2	2	—	—	1	5	—	—	—	—	—	—	—	—	2	—	1	—	41.4	12.2	0.0	2.4	59	J. Morton, M.B.
Halifax	71,500	174	107	29	14	*	*	*	20	10	—	1	5	—	—	2	2	22	15	2	9	29.6	18.2	1.7	3.7	167	D. Ainley.
Hanley	48,091	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. S. Walker, M.D.
Hindley	12,000	54	22	8	4	1	1	4	4	1	—	—	1	—	—	—	—	3	5	1	—	54.8	22.3	1.0	3.0	148	J. G. Brayton.
Ilfracombe	5,300	28	4	1	—	—	—	—	3	—	—	—	—	—	—	—	—	1	—	—	—	64.2	9.2	0.0	0.2	36	E. J. Slade-King, M.D.
Jarrow	22,000	75	25	11	1	2	1	6	4	5	—	—	1	—	—	1	3	3	1	—	—	44.4	14.8	3.0	1.8	147	J. Spear.
Keighley	27,000	50	33	5	5	2	2	7	12	4	—	3	1	—	—	—	—	5	1	—	—	22.5	14.9	1.8	2.3	100	A. Roberts.
Kidderminster ...	22,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	D. Corbet.
Leamington	23,814	48	18	1	1	2	2	6	6	2	—	—	2	—	—	—	—	—	1	—	2	24.5	9.2	1.0	0.0	21	J. S. Baly.
Leigh	20,400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Hall.
Littlehampton	4,032	13	5	1	—	2	—	—	2	—	—	—	—	—	—	—	—	1	—	1	—	39.3	15.1	0.0	3.0	77	C. Kelly, M.D.
Longton	23,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	J. Weaver, M.D.
Lytham	5,000	11	4	1	—	—	1	1	1	—	—	—	—	—	—	—	—	2	1	1	—	26.8	9.7	0.0	4.9	91	W. E. Pountney, M.B.
Maidenhead	8,052	17	11	1	1	—	—	5	4	1	—	—	—	—	1	—	—	—	2	—	3	25.7	16.6	1.5	0.0	59	W. T. Woodforde, M.D.
Merthyr Tydfil ...	50,350	132	63	12	5	5	5	21	15	2	—	—	—	—	—	2	—	9	11	1	—	31.9	15.2	0.5	2.2	91	T. J. Dyke.
Newbury	8,097	27	12	1	1	1	—	3	6	1	—	—	—	—	—	—	1	—	1	3	1	40.5	18.0	1.5	0.0	37	W. T. Woodforde, M.D.
Newcastle-under-Lyme	18,000	45	19	7	2	1	—	7	2	2	—	—	—	1	—	—	1	3	2	1	1	30.4	12.8	1.4	2.0	156	St. J. Edwards, M.D.
Oldham	111,318	298	135	40	20	5	8	39	23	19	—	1	4	1	2	1	10	26	16	6	12	34.9	15.8	2.2	3.0	134	J. M. Sutton, M.D.
Oakworth	5,800	14	5	—	1	—	—	1	3	1	—	—	1	—	—	—	—	—	—	—	—	29.4	10.5	2.1	0.0	—	F. W. Barry, M.D.
Penzance	11,000	25	8	—	—	—	1	2	5	—	—	—	—	—	—	—	—	2	1	—	—	27.6	8.8	0.0	2.2	—	J. Symons (Deputy).
Preston	87,600	261	149	58	38	7	7	24	15	39	—	3	9	1	—	1	25	27	11	3	3	38.8	22.2	5.8	4.3	222	H. O. Pilkington.
Reading	40,000	114	46	13	3	5	2	14	9	4	—	—	1	1	—	—	2	2	4	2	7	34.7	14.0	1.2	0.6	114	J. Shea, M.D.
Redditch	9,686	35	31	8	8	—	2	11	2	7	—	5	—	—	1	—	1	2	4	—	—	44.0	38.9	8.8	2.5	229	H. M. Page.
Rochdale	71,200	191	88	23	10	3	6	25	21	11	—	1	2	1	—	—	6	20	8	3	—	32.6	15.0	1.9	3.4	120	J. M. Wilson, M.B.
Rochester	18,352	64	32	6	5	2	3	8	8	1	—	1	—	—	—	—	—	6	3	1	6	42.4	21.2	0.7	4.0	94	J. S. Knight, M.D.
Rotherham	31,631	95	36	*	*	*	*	*	*	5	—	—	1	—	1	—	3	—	—	—	5	36.5	13.8	1.9	0.0	*	J. Hardwicke.
Rowley Regis	27,000	91	33	19	7	1	1	1	4	3	—	—	—	—	—	—	3	—	—	2	—	41.0	14.9	1.4	0.0	209	H. R. Ker.
Skipton	9,100	25	12	1	3	—	—	4	4	2	—	1	—	—	—	—	1	2	—	1	1	35.8	17.2	2.9	2.9	40	F. W. Barry, M.D.
Smethwick	21,000	69	21	11	1	1	—	5	3	3	—	—	—	—	—	—	3	4	2	—	—	40.0	12.2	1.7	2.3	159	W. Sutton.
South Shields	61,000	173	73	22	17	10	1	13	10	25	—	1	15	—	2	2	5	13	5	1	5	37.0	15.6	5.3	2.8	127	J. Spear.
Stalybridge	23,124	60	27	12	6	2	1	1	5	5	—	1	2	—	—	—	2	10	4	1	—	31.6	14.2	2.6	5.3	200	F. J. Roberts-Dudley
Swansea	65,000	201	116	22	18	17	17	32	10	33	—	—	4	—	—	27	2	7	17	1	7	37.6	21.7	6.2	1.3	109	E. Davies.
Teignmouth	7,000	15	5	2	—	—	—	1	2	1	—	—	—	—	—	—	1	—	1	—	—	26.1	8.7	1.7	0.0	133	W. C. Lake, M.D.
Torquay	25,000	*	23	7	—	1	—	7	8	—	—	—	—	—	—	—	—	3	2	2	1	*	11.2	0.0	1.5	*	P. Q. Karkeek.
Toxteth Park	8,000	26	14	2	3	1	2	5	1	1	—	—	—	—	—	—	1	—	—	—	—	39.5	21.3	1.5	0.0	77	R. W. Pendleton.
Warrington	37,000	154	46	11	9	2	6	8	10	8	—	1	3	—	1	—	3	4	3	2	8	50.6	15.1	2.6	1.3	71	G. W. Joseph.
Wednesbury	26,000	72	32	13	5	2	1	2	9	3	—	—	—	—	—	—	3	3	2	—	—	36.1	16.0	1.5	1.5	181	J. C. Garman.
West Derby	32,263	95	50	7	9	5	5	15	9	9	—	—	6	—	—	—	3	2	5	—	2	35.8	18.9	3.4	0.8	74	W. Carter, M.B.
Widnes	22,000	91	33	7	14	5	—	5	2	4	—	—	3	—	—	—	1	5	2	1	—	50.3	18.3	2.2	2.8	77	W. Cooper.
Withington	15,000	34	11	2	—	2	1	5	1	2	—	—	1	—	—	—	1	1	—	2	—	27.6	8.9	1.6	0.8	59	T. C. Railton, M.B.
Worthing	9,365	23	9	1	—	—	1	3	4	—	—	—	—	—	—	—	—	—	1	2	1	29.9	11.7	0.0	0.0	43	C. Kelly, M.D.
York	46,436	109	81	29	4	8	2	24	14	17	—	—	4	—	—	—	13	7	7	4	3	28.6	21.2	4.5	1.8	266	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

21.7 in Swansea, 27.1 in Bridport, 27.2 in Carnarvon, 28.0 in Belper, and 38.9 in Redditch. The excess in many of these last-mentioned towns was, to a considerable extent, due to exceptional fatality of zymotic diseases.

The annual death-rate from the seven principal zymotic diseases in the 67 districts averaged 2.3 per 1,000 in September, against 3.9 in the twenty larger towns. Not a single death from any of these seven diseases was recorded during the month in Abingdon, Bangor, Bromsgrove, Carnarvon, Congleton, Guildford, Ilfracombe, Littlehampton, Lytham, Penzance, Rowley Regis, Torquay, or Worthing. The following high death-rates from these diseases appear in the table :—Derby, 4.1 ; York, 4.5 ; Gorton, 4.5 ; Belper, 4.9 ; South Shields, 5.0 ; Preston, 5.4 ; Swansea, 6.2 ; Redditch, 8.8 ; and Bridport, 13.6. Measles caused the high zymotic death-rate in Bridport and Redditch, and scarlet fever in Derby and South Shields. Both measles and scarlet fever were somewhat fatally prevalent in Preston, and the remarkable epidemic of enteric fever caused 27 more deaths in Swansea, against 30 in the preceding month. No fatal case of small-pox was recorded in any of these 67 urban districts during September.

Diseases of the respiratory organs (not including phthisis) caused 361 deaths in the 67 sanitary districts, which were equal to an annual rate of 2.2 per 1,000, corresponding with the rate from the same diseases during August. In London, the death-rate from these diseases during the four weeks ending 27th September averaged 2.4 per 1,000, which, as in the 67 smaller towns, slightly exceeded the rate that prevailed during August. It may be noted that the death-rate from these diseases was exceptionally high in Stalybridge and Carnarvon, in which towns it was equal to 5.3 and 8.3 per 1,000 respectively.

The registration of births, on account of the longer period during which this public duty may be fulfilled in accordance with the Births and Deaths Registration Act, is subject to greater fluctuations than the registration of deaths, which is, in most cases, effected previously to the burial of the deceased person. The monthly numbers of registered births do not always, for small districts, afford a trustworthy means for measuring infant mortality, although in a summary of the figures for several months the facts may be fully relied upon for this purpose. In the aggregate of the 67 sanitary districts the proportion of deaths under one year to births registered during September averaged 128 per 1,000, against 155 in the twenty larger towns. Thus the rate of infant mortality in these smaller sanitary districts, although showing an increase upon that which prevailed during August, was considerably below the rate in the larger towns ; it showed, however, a marked excess in Altrincham, Gorton, Preston, Redditch, Rowley Regis, Stalybridge, and York.

We shall be glad to send stamped cards, on which the required information may be supplied with the least possible trouble, to any medical officers of health who may feel themselves able to contribute to our future monthly tables of urban mortality statistics. We also invite suggestions with a view to improving these returns, and increasing their value, as indicative of sanitary condition, for comparative purposes. From the commencement of 1880 we hope to receive monthly returns from a much larger number of urban sanitary districts, and therefore it is desirable that any suggested alteration in the form of the return, or in the nature of the information supplied, should be carefully considered before the close of the year.

SPECIAL REPORTS.

ENTERIC FEVER AT CHICHESTER.

THE outbreak of enteric fever at Chichester, already alluded to in these columns (vol. x, p. 277), has now been reported on at length by Dr. Hubert Airy to the Local Government Board. The outbreak proves to be another of the now frequent cases of epidemics produced by milk. Something like fifty persons were attacked in thirty houses, six cases being fatal. Inquiry showed that out of fifty-nine families using milk, either wholly or in part, from a particular dairy, no less than about twenty-six, or forty-three per cent. had in the course of the epidemic, more or less distinct cases of typhoid fever. Amongst something like forty other families in the locality who used other milk, not a single case occurred. Dr. Airy has evidently devoted much pains to discovering the method in which the milk became specifically polluted, but he confesses himself unable to account for it unless the poison was introduced into the milk in the act of milking. He explains that at the particular dairy, the operation of milking is performed in an old boarded five-stalled milking-hovel, which stands in the meadow about thirty-five yards from a stream called the 'Lavant'. This stream, which is dry in summer, is the receptacle of the contents of many privies, and before the epidemic began, had almost certainly received typhoid ejecta into it. The milkman, having brought the cans clean from the dairy, takes them straight to the hovel, never rinsing them in the stream. Having gathered his cows, and girded himself with a coarse apron, he proceeds to wash the udder of the cow he is about to milk, the udder being often soiled with the cow's own droppings or from lying in the meadow. For this purpose he resorts to a bucket which has been filled from the Lavant stream, when running. In times of drought he carries with him some water from the dairy pump instead. Having cleansed the udder and his own hands he rapidly wipes them with his apron, and proceeds with his milking. His hands occasionally are moistened with the milk, and anything remaining from the previous washing on his hands or the cow's teats is thus brought into contact with the milk. In this way an extremely minute portion of Lavant water may become mixed with the milk in the can. Dr. Airy was quite satisfied that there had been no wilful dilution of the milk, either with Lavant water or pump water, not only because of the manifest honesty of the milkman, but from the general accordance of testimony among his customers as to the richness of the milk. An analysis of the milk also had been made, and gave no evidence of any dilution. The act of milking then was the only moment at which any opportunity for specific contamination of the milk could be detected. Whether so minute a quantity of the poison could so rapidly impart its poisonous properties to the milk as to cause enteric fever in so large a proportion of those who drank of it, must be an open question. We have some reason to think that very small quantities of infective material can go on multiplying when introduced into milk, somewhat as they go on multi-

plying when they produce disease in the human body, and it may be suggested as conceivable that the warmth of the milker's hands and of the fresh-drawn milk might accelerate such multiplication.

Incidentally Dr. Airy gives but a very sorry picture of sanitary administration at Chichester. He points out that although the sanitary state of the city was inspected as long ago as 1865 by Dr. Seaton, on behalf of the Government, no real improvement has since taken place. The death-rate (20.7 per 1000) is still much higher than it ought to be in a place possessing the natural advantages of Chichester, and the prevalence of enteric fever amongst children noticed by Dr. Seaton still continues. As regards drainage, the city is in the same state as it was fourteen years ago. The stream already described serves as the main sewer for the outskirts of the city, and there is a smaller open one about 150 yards long. But the great bulk of the city is still drained into cesspools, which are often in dangerously close relation with wells from which the greater part of the drinking water is still obtained. The porous gravelly soil gives every facility for the soaking of filth from the cesspools into the wells; and it is notorious that this often happens. Yet notwithstanding this, and the fact that a water company which provides some 250 houses has an ample supply for the whole population, the Authority has taken no steps to enforce the disuse of polluted wells. The refuse removal is badly done, and the privies are emptied only when the occupier chooses. The authority possess no bye-laws, and probably would not enforce them if they did.

THE SOCIAL SCIENCE ASSOCIATION.

MANCHESTER, OCT. 1 TO 8, 1879.

PRESIDENT'S ADDRESS.

AT the opening meeting of the Congress of this Association, held at Manchester on October 1, the President, the Right Rev. The Bishop of Manchester, in the course of his address, descanted on some subjects concerning public health, as follows:—I propose to touch on the class of questions which concern themselves with the health of our vast urban populations, or, as they are sometimes called, by a hideous but convenient word, questions of sanitation. I do not intend to discuss questions of hereditary or congenital disease, though the remarkable increase of lunacy in the nation, and connected with that, the question of intermarriage between persons in whom the maniacal taint is known hereditarily to exist, are matters of supreme and almost paramount importance; but I do not discuss these, because they apply almost equally to sparse and dense populations, and it is to the social phenomena affecting the latter that I wish to confine myself. Good health in towns may be said to depend on four primary conditions: A good water-supply, good drainage, good air, well-constructed and wholesome homes. I would premise that a great number of misleading ideas lurk under what I may call the 'fallacy of averages'. By the exertions of the two Corporations I believe that the death-rate in Manchester and Salford has been very sensibly reduced, and does not now exceed more than 20 or 22 per 1,000 under normal circumstances; and for some time past they have been wonderfully free from epidemic or infectious disease. But, as I have often heard the late Mr. Cawley, M.P. for Salford, who from his knowledge as a civil engineer could speak accurately on the subject, state at meetings on sanitary subjects that, while the rate of mortality in Higher Broughton, the salubrious level on which he and I lived, did not exceed 10 or 12 per 1,000, there were courts and alleys in Salford where it would rise as high as 60 or 70. And you lose this disparity of facts, when you come to strike an average, which of course does not represent any actual fact at all. The chief difficulty in dealing with these great and important questions affecting the public health arises from the fact that municipal bodies and local boards rarely attack the evil till it has become intolerable; and, when they do attack it, they find it encumbered with so many vested interests or acquired rights that it is almost impossible to deal with it effectively, except at a cost which is enough to frighten them from dealing with it at all. It is this difficulty that has rendered the Act for preventing the pollution of rivers in many places practically inoperative. I know that our excellent Town Clerk of Manchester (Sir Joseph Heron) stoutly maintains that the Irwell leaves Manchester in a purer condition than it enters it, by which statement I suppose he means that it deposits the pollution which it brings with it from its upper waters in its course through the town, while by the regulations of the Corporation no fresh foulness is poured into it by Manchester itself. I do not know how this may be; but I do know that to gaze upon the stream of the Irwell just where the waters of the Irk mingle with it is not quite so pleasant a prospect as the mingling of the waters of the Ottawa and the St. Lawrence above Montreal; and local history records that two or three years ago a poor fellow who fell overboard in a regatta, though he was rescued from drowning, yet was unable to rally from the effects of the poisonous liquid that found its way into his stomach. With regard to the general water-supply—whether for drinking or for household and manufacturing purposes—of our great cities, and indeed of the country at large, for there are small rural villages which have quite as great a difficulty in obtaining a sufficient supply of pure water as any of the great towns, I am entirely of the opinion that was expressed in a letter written in the course of last year by his Royal Highness the Prince of Wales to the Society of Arts, which excited a good deal of attention at the time, and which seems to be shaping itself into some practical convictions in the public mind. It is neither right nor wise that the present haphazard system should be continued; that great towns, on the principle of 'first come first served', should be allowed to choose their collecting grounds for themselves; and it has become, if we are at all to consult for the interests of posterity, a peremptory necessity that England and Wales should be divided into districts by competent authority for the sufficient supply of wholesome water for the populations residing in each. The story of Manchester and Thirlmere is well known, and need not be repeated; but I think I can pretty confidently say, having inspected the spot carefully, and knowing that what is proposed to be done is simply to give a water service of about 800 acres instead of the present one of barely 300, that Manchester's desire to secure a pure water-supply for its inhabitants is not vandalism, and that nature will not be disfigured by the operation. But I thought it was quite right that the House of Commons should require Manchester to consider the claims and needs of towns and places on the route of supply. The drainage of a great

city has a direct connection with its water-supply, especially if that supply is to any extent dependent on a river flowing through its midst, and the effect in the drainage of a great city is still one of the gravest social and sanitary problems. The sewage system of Manchester is rapidly advancing to completion, and the process pursued at the large municipal establishment at Holt Town is well worthy of the notice of members of the association. The chief product of this system is a concentrated manure suited for agricultural purposes, of which it is estimated that from 20,000 to 30,000 tons can be produced in a year, and if sold at the low rate of £2 a ton would give a profit of 1s. 9d. to 2s. a ton. The gross annual expense of the night soil department is between £60,000 and £70,000; and this profit, if attained, while it will dispose of refuse likely to be injurious to health, will also sensibly lighten the burden to the ratepayers. Another process, known as General Scott's first system, is in operation in Burnley, a town of 50,000 people; and yet another, known as Scott's second system, is in operation at Blackburn, a town of 80,000 people. At Blackburn they produce a manure containing 5 per cent. of ammonia and 20 per cent. of phosphate, estimated by Dr. Vœlcker, chemist to the Royal Agricultural Society, to be of the value of £6 a ton. At Burnley, the Corporation made a cement said to be equal to the best Portland, of which this is a specimen. The great advantage of the Burnley system is that it requires very little land, and no large amount of costly buildings. The whole cost of the works at Burnley has been from £10,000 to £12,000; and the subsidy paid by the Corporation to Scott's Company for the license to work the process is £1,070 per annum. The Town Clerk of Burnley, in answer to an inquiry that I addressed to him, gives a gratifying, indeed, almost a picturesque, account of the results. The works have been in operation about two years, and he says:—'I think the result is highly satisfactory. Scott's Company treat about 1½ millions of water-carried sewage daily; and the effluent they turn into the river is pure enough for trout to live in. I have seen fish within a few yards of the outfall. There is no more smell at the works than is to be noticed in an ordinary farmyard. The cement made from the sludge, all of which is burnt in kilns, is of a very good quality, and finds a ready sale.' It is at least a satisfactory thing to record that the local authorities in the great towns of Lancashire (Rochdale is, I believe, following the steps of Manchester) are fully alive to the importance of this sewage question in its relation to health, and are adopting energetic measures of dealing with it. The air we breathe, and the purity of which is so essential to our health, both of body and mind, is chiefly affected by ventilation of our houses, and by the absence or presence of deleterious vapours and gases in the atmosphere. Smoke is not the only nor the worst offender in this respect. The chemical, and particularly the sulphurous, vapours that are given off, even when the smoke is consumed, are more injurious to human life and more noxious to vegetation than those dense black columns of unconsumed carbon which not only indicate our wasteful habits of consumption, but deface some of the most naturally picturesque districts in the land. Some few years back I was visiting the hematite ironworks at Carnforth, which at that time were in full operation. I was being shown over them by Mr. Barton, the manager. I noticed a thin column of white vapour issuing from the tall chimney; and I noticed also that the chimney itself was scarcely discoloured, though it had been discharging the duties of a chimney for many years. 'Do you never give off anything worse than that?' I inquired of my companion. 'Scarcely ever,' was his reply; 'and the best of it is, our consumption of our smoke saves us £30,000 a year'—I admit it was at a time when coal was at a high price—'in fuel.' 'How is it, then,' said I, 'that everybody does not follow your example?' 'Oh,' he said, 'partly from want of proper looking into things; and partly because to produce this result requires a peculiar construction of the works, which, in the case of old establishments, may not be possible.' I have sometimes heard a little good-humoured bantering between officials of the two neighbouring Corporations of Manchester and Salford—which are animated by a happy rivalry, which tends very much to the public advantage—as to which body does most to suppress the smoke nuisance within their respective territories. I believe laudable efforts are made by both; but if I, looking at things with the uninstructed eye of a private individual, may venture to express an opinion, I think that both Corporations may even do yet more. I am afraid that in some of our other large Lancashire towns there is hardly an attempt made to abate the mischief. To use a homely phrase, so many people are 'tarred with the same brush', that it is not very easy for those in authority exactly to know where to make a beginning. I can only say, living only two miles from the centre of the city, that if we could always breathe in Manchester the air we breathe on our finest days, we should not have much ground of complaint in respect of its insalubrity. I am not quite sure to what extent the mass of our working classes in Manchester are gainers by that displacement to which I have already referred, and by which they have been compelled to migrate from the centre of the town to the suburbs. Externally, and while the houses are new, the gain looks considerable; and, of course, it is an immense benefit to the health and also to the morals of the community, that the Corporation have succeeded in closing, I believe, every one of the cellar dwellings, which once existed by hundreds, and which were centres of disease, and, partly as a result of the unhealthy conditions under which the people lived, of vice in so many forms. But an instructive pamphlet entitled *Urban Leaseholds* (Hodder and Stoughton, 1879), quoted in a recent pamphlet of the Howard Association, on the connection between overcrowding and crime, does not give a very cheering picture of these modern suburban 'houses made of half-baked clay and mud and compo, with raw shrinking timber, gaping joiners' work, foul chimneys, unsound roofs, damp basement rooms, and inefficient drains.' 'Ædiles', says the pamphlet from which I have taken this quotation, 'are everywhere wanted. Not merely the existing public surveyors, but officers armed with effectual powers to prevent the erection of all dwellings unfit for human habitation, and to make fit those now unfit, at the expense of the owners and builders. Deterrents should be raised against bad buildings.' All I say is, for goodness' sake don't let us have a new set of officials. Arm those who exist already with effective powers, if they do not already possess them. I know, from my own personal experience, that our two Corporations are vigilant in this respect; but an extract that I will presently read from a communication that I have received from the admirable medical officer of the Manchester Corporation is enough to show that more is required to be done in this direction. I am

afraid that just now, owing to short time and want of employment and diminished wages, a good deal of overcrowding could be discovered in Manchester—for the sake of saving rent and fuel and gas, two, and sometimes three families, crowding into one tenement, which, under ordinary circumstances, would only be occupied by one. There is a difficulty in knowing how to deal with such cases, to which it is the poverty, not the will, of the people that is consenting. It would be harsh, and might be impossible, at such a crisis to enforce the usual regulations; and the most that can be done till good times return seems to be to exercise a more than ordinary vigilance to prevent the outbreak of anything like epidemic disease in consequence of such overcrowding. It is one of the frequent cases in which necessity must be allowed to break away from the control of law. I spoke just now of a communication which I have received from Mr. Leigh, the medical officer of the Manchester Corporation, in which he summarises the work effected by the Health Committee, which was appointed about ten years ago, and, under its energetic chairman, has been fruitful of good results to the city. The extract will give some idea of what the Health Committee of the Corporation of a city containing 360,000 inhabitants has to do. 'Through its instrumentality, there has been provided complete hospital accommodation for cases of infectious diseases occurring in adults, as well as in the earlier years of life down to early childhood. It has rendered assistance to the committee of the Children's Hospital, Pendlebury, in providing accommodation for some of the infectious diseases of childhood.' Indeed, it may be said that the provision for adults and young persons suffering from infectious diseases is now unlimited, as it may be enlarged to any extent. All houses, with their contents, in which infectious diseases have occurred are thoroughly disinfected. There is an organised system of inquiry for cases of infectious disease. All underground dwellings, such as inhabited cellars, which were very numerous in the city ten years ago, are closed. Drains and sewers are ventilated by shafts fixed at their highest points, and carried above the eaves of the houses, of which several thousands have been erected. The committee have diverted from the sewers all excretal matters, except such as drain into them from the few water-closets in the city. They have reconstructed, within about 1,000, the whole of the old midden closets in the city, amounting to nearly 60,000. All such closets are emptied bi-weekly, and their contents converted into valuable manure and mortar, with great reduction of the volume of effete material. They secure the utilisation of all kinds of refuse, whether animal or vegetable, and nearly all mineral matter, so that it can be said that no rubbish now exists for any length of time in the city, or matters which cannot be made available for some useful purpose. The importance of this may be estimated from the fact that the amount of matter which, under the old system, could not possibly be disposed of outside the city would annually fill an area equal to St. Ann's Square—*i.e.*, probably 100 yards by 50—'to a height of 80 ft., which is now satisfactorily disposed of without the production of any nuisance.' 'The city is divided into sanitary districts, over which inspectors are appointed, and which are visited also by the Officer of Health and the chief officers of his staff. The disconnection, not quite completed, is rapidly progressing, of all sink-pipes, drain-pipes, and water outlets of every description, with the drains and sewers. All houses are being closed as rapidly as possible which are deemed unsuitable for human habitation. A careful inspection is made of all localities in which infectious diseases are likely to occur. Provision is made for the removal of infected persons, and mortuaries have been established. A means is provided for the analysis of all injurious or adulterated matters, whether of food or of other materials. These', concludes Mr. Leigh, with a just pride, 'are some of the more important matters to which the committee have specially attended, and with the result of having lowered the mortality of the city to a very large extent. Typhus and typhoid fever, though not absolutely extinguished, are of comparatively rare occurrence, and nearly all other infectious diseases have been largely reduced in amount, whilst the general health of the people has been improved.' Mr. Leigh concludes his interesting letter with a few highly instructive remarks. Coming from an officer of his ability and experience, I commend them very earnestly to the attention of the Congress. 'The points', he says, 'to which I would specially call attention are: First, by legal action and the provision of adequate inspection to secure a better class of houses for the residence of the poor. The houses in the centre of Manchester, extending over an area of more than 600 acres, have been so far removed for the improvement of the city and the exigencies of commerce, that the dwelling-houses only number, on an average, nine to the acre over this space. The remainder of the city, up to its boundary, is now nearly covered, so that any considerable increase of houses for the working classes connected with Manchester must be erected in the suburban districts. At present, the houses, as a rule, rise directly from the surface of the ground, without any intervening air-space. The walls are excessively thin, and the mortar of the poorest quality. Such houses are necessarily damp, and must be productive of rheumatism, heart disease, and bronchitic affections. An air-space at the basement should be insisted on, and means adopted for preventing the rise of moisture into the walls, which should be thicker and of better quality. The facilities for obtaining intoxicating liquor should also be diminished, as there can be no doubt that not only those who indulge in continued and excessive drinking suffer greatly in health and have their lives shortened, but that young children suffer greatly and are subject to an excessive rate of mortality from the neglect to which they are exposed in consequence of the indulgence of this vice. It is much to be regretted that workmen's villages, constructed with due regard to the requirements of health, cannot be founded and provided with frequent and rapid means of communication with the city. The provision of open-air spaces in the city, for ventilation and as playgrounds, by the destruction of some of the oldest and worst dwellings in the city, is very desirable. Manchester is well supplied with pure water, and it may fairly be hoped that in a few years, from the investigations going on and the many ingenious contrivances brought out, the atmosphere will be freed from smoke and its concomitant impurities.' Thus far Mr. Leigh. There is just one other point on which I should like to say one word. I refer to the provision made in our cities for the interment of the dead. I observed a statement in a recent *Manchester Guardian* that 'The attention of the Secretary of State is being urgently directed to the condition of some of the metropolitan cemeteries, which, it is said, are be-

coming sources of peril, not only to the neighbourhood in which they are situated, but to the whole metropolis.' On Friday last I consecrated a portion of a new cemetery, provided by the Corporation on the south side of Manchester, fully five miles from the centre of the city, containing 97 acres, at a cost, including the land, the fencing, the laying out, and the inevitable three or four chapels, £100,000. I feel convinced that before long we shall have to face this problem, 'How to bury our dead out of our sight', more practically and more seriously than we have hitherto done. In the same sense in which the 'Sabbath was made for man, not man for the Sabbath', I hold that the earth was made, not for the dead, but for the living. No intelligent faith can suppose that any Christian doctrine is affected by the manner in which, or the time in which, this mortal body of ours crumbles into dust and sees corruption. I admit that my instincts and sentiments—the result, however, probably of association more than of anything else—are somewhat revolted by the idea of cremation. But they are perhaps illogical and unreasonable sentiments. Sir Henry Thompson has stated the case in a calm and thoughtful paper which shows how little ground there is for the somewhat morbid sentiments that indeed prevail in relation to the whole subject of the interment of the dead. There is another method, which is popularly known as 'the earth to earth system', which may be as efficacious; and if so, would be preferred by myself and many more. All I call attention to is that it is a subject that will have to be seriously considered, and that before long. Cemeteries are becoming not only a difficulty, an expense, and an inconvenience, but an actual danger.

PROCEEDINGS OF THE HEALTH SECTION.

In the Health Department, under the presidency of Mr. F. S. Powell, Mr. Alfred Haviland (Northampton) delivered an address on the special question, 'What are the evils resulting to health from the growth outside the boundaries of municipalities of suburban districts without due regulation and control?' He said he was medical officer of health over a very large area. He believed, altogether, he had about as many villages and towns under his charge as there were days in the year, and 1,000 square miles to go over. In a paper he read before the Society of Medical Officers of Health in London two years ago he proved that there were in large areas certain epidemic centres. From those centres there were certain circles around, showing that the spread of disease from the centre was in the inverse ratio of the distance. Speaking generally, as a result of his investigations, he had been impressed with the necessity of there being but one law in regard to sanitary matters. There should be no distinction between urban and rural authorities. Rural districts were exposed to constant danger from their proximity to epidemic centres, in consequence of there being no strict regulations with regard to sanitary matters. He hoped some resolution would be formulated urging upon the Government the necessity of a change in the law, in order that rural sanitary authorities might have the same powers as those enjoyed by urban or municipal authorities. There must be a more thorough inspection of the districts, and therefore more inspectors should be appointed.

Mr. Fuller, chairman of the Withlington Local Board, said he thought that the best thing that could happen to the suburbs of Manchester would be the absorption of all the score of local Boards within a circuit of four or five miles within the jurisdiction of the Manchester Corporation.

Mr. Haviland moved,—'That this meeting recommends the Council to memorialize the Government that, in order to lessen the evils resulting to health from the growth of suburban districts outside the boundaries of municipalities, powers be obtained to bring both the municipal area and the suburban district under the control of one sanitary authority.'

Professor Gairdner (Glasgow) seconded the motion, which was carried.

A very interesting paper 'On the Influence of Sewage Farms on Public Health' was read by Mr. Baldwin Latham, C.E. The author drew attention to the fact that a large number of sewage farms had been established throughout the country, and that an investigation into the condition of the health of those residing in the neighbourhood of these farms, or working or living on them, showed beyond doubt that sewage farms were not prejudicial to health. In the case of the Croydon Sewage Farm it was shown that the death-rate of the district in which the farm was located for the ten years previous to the sewage being taken on to the land averaged 17.06 per 1,000 per annum, the zymotic death-rate was 2.5 per 1,000, the fever death-rate was 0.95 per 1,000, and the diarrhœa death-rate was 0.74 per 1,000 for eighteen years. Subsequent to the sewage being taken on to the farm, the general mortality of the district was 15.09 per 1,000, the zymotic death-rate 2.75 per 1,000, the fever death-rate 0.32 per 1,000, and the diarrhœa death-rate 0.86 per 1,000. It was also pointed out that in the census period between 1851 and 1861, which included the period before the sewage was taken into the district, the rate of increase of the population was 1.1 per cent. per annum; but that in the census period 1861 to 1871 the rate of increase was 6.2 per cent. per annum, which was evidence that the sewage farm did not deter people from residing in the district. In the case of the Norwood Sewage Farm, it was also shown that between the years 1857 and 1865, or prior to the sewage being utilized on the land, the death-rate of Norwood was 17.24 per 1,000, and in the ten years subsequently, 1866 to 1875, the death-rate of this district was 13.62 per 1,000. An examination of the influence of nine sewage farms on health—viz., Aldershot, Bedford, Birmingham, Croydon, Doncaster, Guisbrough, Leamington, Reading, and Wrexham—showed there were 380 persons who either resided or were employed on these farms, that they had been in operation on an average over ten years, that there were 137 children residing on these farms, that only ten deaths had occurred among those living or working on the farms, and that the death-rate upon these farms was under three per 1,000 per annum—a rate sufficiently low to show that sewage farming was a healthy occupation. It was further shown that when particular epidemics, as of typhoid fever, had been epidemic in the town of Croydon, the neighbourhoods of the sewage farms did not suffer from the disease, but that the exposure of sewage as an irrigation appeared to destroy the noxious properties of the infected sewage. In conclusion, the author pointed out that if the healthiness of sewage farms could only be fully realized, towns would not be mulcted in the heavy expenses which they now have to pay by reason of the opposition to the establishment of such works, and also for the alleged damage to adjacent land which had often to be paid when land was

acquired under compulsory powers for sewage purposes.

Dr. Ransome, of Manchester, observed that there was much reasonable scepticism as to the figures of average death-rate, and with regard to the very remarkable averages in Mr. Latham's paper, he suggested as one source of fallacy the probability that many of the houses near the Croydon farm, and one or two of the other places mentioned, were those of well-to-do residents employing servants, who did not remain there to die, but went away to their own homes in other localities.

Mr. F. S. Powell, President of the Health Section, read a paper on 'The Progress made in Sanitary Science and Practice throughout the Kingdom in Recent Years'. Noticing the difficulties in practical working and the deficiencies in legislation by which progress was still impeded, Mr. Powell said: The first great and fatal hindrance is the political position of the Health Minister. He is the President of a Board which does not exist. He cannot submit his schemes to a Cabinet from which he is ordinarily excluded. He cannot press forward his Bills amid the friendly competition of secretaries or First Lords, for he is neither secretary nor First Lord. He is not certain that a provincial deputation will not pass his humble doors and press on to Her Majesty's Secretary of State at the Home Office. He is overshadowed in debate, and is censured by his political opponents as less liberal and enlightened than the Minister who thus supersedes him. He must needs administer under a sense of his secondary position. He has but partial command of his department, for therein—to mention one defect only—no place is found for factory enactments or mining regulation statutes—Acts which exist for health alone, which, unless justified by the necessities of health and life, as I, for one, most firmly believe them to be, in substance, if not in every minute detail, are an impertinent interference with free contract, and an indefensible restraint on trade. These are health enactments, not police regulations. Their administration is the function of the Health Minister, whose daily duties relate to disease and the prevention of disease, who commands at his office the aid of the highest science, and possesses a skilful medical staff distributed throughout the country. It is not the function of a Home Secretary, who has no official knowledge of public health, has no medical staff except such as is created for a special purpose, and whose mind, engrossed in the vast and multifarious duties of his office, can, some philanthropist of rare gifts excepted, devote but little energy to a range of subjects lying outside his province. Dr. Ballard, within the Health Department, makes elaborate reports to the president on nuisance effluvium arising from noxious trades. His work is then complete, and the periodical inspection of those works, if under the Factory Acts, is relegated to another department. The officers of this department continue their duties without reference to the researches of Dr. Ballard, and only by accident or under the influence of some unofficial enthusiasm, learn that such investigations have occurred. It would appear mere waste of time to strengthen this position by fresh arguments, did not experience prove the difficulty of carrying into effect an organic change in the great political arrangements of this country. To my mind the change has long appeared a paramount necessity. Experience since the constitution of the new office has greatly confirmed that opinion; and I feel convinced that those who desire the efficient working of our laws dealing with poverty and disease should devote their fullest energies to a reform which will place the Minister who deals with these subjects on an equality with those who, being entrusted with the most weighty responsibilities, enjoy a dignity and occupy an acknowledged position corresponding with their high functions. He will thus be elevated to a position more worthy of an authority ranging over every parish, and dealing with subjects parochial in detail, but national in principle—nay, even more than national in their results, because therefrom comes the strength of a nation which possesses influence, more or less direct, over civilisation. He will thus acquire new power, and those who desire to promote the vigour of their race and the diminution of poverty, will no longer see needful legislation postponed until the sportsman commands the prorogation of Parliament, and for a season forgets the health of the people in the assiduous cultivation of his own. Respecting local authorities in the provinces, one word must suffice. It may safely be predicted that but few areas will be created by Private Improvement Acts. It is earnestly to be desired that new local boards will have assigned to them boundaries coincident with existing areas, and that these areas will be sufficiently large for administrative purposes. For the rural sanitary authority there is at hand a reform which will confer additional strength and stability. The guardian elected for three years, not for one, will feel new confidence, and, secure for a comparatively long term of office, will take heart, and throw even more mind into his work. Meanwhile, the annual election of one-third, by creating discussion, will enlighten that public opinion which the issue of successive contests cannot fail to test. The guardians, already endowed with sanitary and educational powers, will, doubtless, when thus elected on a sounder principle, be entrusted with additional functions, and will rise to a yet higher influence. The same bodies, in fact, though perhaps having a different name, will become rural municipalities—important when thus acting within their own district; even more important from their relations with the great county authority, which is destined at an earlier or later day to exercise powers of no secondary importance. As an instance of evils still to be remedied, the following statements were introduced:—Mr. Spence, of Manchester, estimates the quantity of oil of vitriol daily discharged into the atmosphere of Manchester at 400 tons. 'Over Widnes alone,' answers one witness before the Noxious Vapours Commission, 'there are yearly discharged from the consumption of coal alone 18,000 tons of sulphuric acid.' These facts relate to dense accumulations in great cities, and there is perhaps less force in the larger figures of Dr. Smith, who estimates the sulphur poured into the air in the course of twelve months by the consumption of coal in our manufactories, ironworks, steam engines, and houses, at no less than one million of tons. Towards the conclusion of his address, Mr. Powell said he would venture to enunciate broad and general principles, which discussions of details—more especially of technical details—have a tendency to obscure:—1. These subjects ought to be taken as one great whole, not as separate, and sometimes conflicting, problems. According to present practice, one engineer pours his sewage into a river, forgetful of river pollution; another, ministering to the necessities of a great community, conveys thereto water from the uplands, taking no heed to the mischief which he thoughtlessly inflicts on those lower down

by diminishing the volume of the river which serves them ; while a third, in devising a great scheme of drainage, ignores the value of the water which he is eager to discharge from the district under his control. In a word, as legislation until the year 1875 had been piecemeal in general enactments, it has been partial and fragmentary as regards localities. As in public statutes, under the influence of a more scientific conception of law, we now pass comprehensive enactments, so in private Acts we must needs regard the wider area of the county or the province. In relation to drainage, navigation, and matters of a similar kind, there are, says the Lords Committee on Conservancy Boards, between 2,000 and 3,000 private Acts now in operation. Each of those Acts probably in some measure conflicts with public or private convenience and advantage in matters not within its scope. 2. The construction of works for water supply in the case of urban districts should be on a large scale, either by combination between lesser communities, or by contribution to them of water collected by towns of greater size. 3. The water supply should be constant. 4. Underground sources of supply should be diligently sought, and more freely made use of. 5. As to sewage, no single system is suitable for every district. The water carriage most convenient for one town does not serve the requirements of another ; and the sewage farm which meets all the wants of this district is impossible in the overcrowded suburbs of the adjoining town. 6. The time of repayment of the loan should be so calculated as to give a wide margin, not only for the natural decay of the works, but for the advance of science, which may render them antiquated at an earlier period than the best men of the present day may believe possible.

Dr. Norman Kerr read a paper on 'The Mortality from Intemperance'. He stated that his estimate presented to the Cheltenham Congress of the annual fatality from intemperance in alcohol was arrived at by applying the results of his own medical experience to the total number of medical men in the kingdom. The medical profession had been supposed to number 16,000, and on this hypothesis his former estimate was based ; but, having since had occasion to communicate with every member of the profession, he found the actual number of practitioners, exclusive of the army and navy, to be 18,090. Dr. Kerr's original computation, then, that 120,000 persons died every year in Great Britain and Ireland from intemperance—40,500 dying from their own excess, and 79,500 dying from the indirect consequences of the excess of others—was far under the truth, as had been from the first contended by Dr. Hardwicke and many competent observers. Dr. Kerr reviewed the fortieth report of the Registrar-General with reference to deaths from alcoholism, and suggested that the Social Science Association should ask confidential returns from 500 medical men in different parts of the country, with a view of arriving at an approximation to the truth. It was significant that gout was more fatal now than it was ten years ago ; and that Italy, a most temperate nation, had only 240 per 1,000,000 of violent deaths, while England, an intemperate nation, had no less than 757 per 1,000,000.

Dr. Hardwicke stated his belief that in his own district the deaths arising from alcohol amounted to about 200 in a year, and he believed for the whole country the number would be about 100,000 a year. He complained that the subject had been 'systematically ignored', not only by that Association, but by medical officers of health throughout the country.

Ultimately the following resolution was adopted by the section :—'This Health Section recommend the General Council of the Social Science Association to memorialise the Government to take such steps to secure in the registration of deaths a greater amount of accuracy as to the real and approximate cause of death, especially as far as the consumption of alcohol is a factor in the mortality of the country.'

Mr. A. T. Atchison read a paper on 'The National Water Supply'. He maintained that there must not be one code dealing with river pollution and the disposal of sewage, another with river conservancy, and a third dealing with water supply. The whole subject must be considered together. If this was conceded, then without doubt the water sheds of the principal rivers must be looked to primarily as the natural boundaries of the different districts. Special arrangements would, however, have to be made with regard to particular towns.

A paper on the same subject by Professor Ansted affirmed that all rivers were more or less contaminated.

Papers were also read by Mr. J. Corbett of Manchester, on the improvement of the sanitary condition of houses by 'stringent local regulations', and by Dr. E. M. Seaton of Nottingham.

On the motion of Dr. Fox of Lymm, seconded by Mr. Haviland, a resolution was passed urging the Council to represent to the Local Government Board the necessity in any future amendment of the laws for enacting and imposing building laws that should be of equal obligation on both town and country.

Mr. F. Vacher, medical officer of Birkenhead, read a paper on 'Infectious Convalescents'.

A discussion on domestic water supply was raised by a paper from Dr. Stevenson Macadam, and attention was drawn to the danger from impurities left in filters. Dr. Macadam said he was dead against filtration. When they passed a couple of gallons say of water through a filter, be it charcoal, a sponge, or any other material, the intention was that all impurities should be left in the filtering material. This went on day by day, and in the course of a short time the suspended matter in the filter would be in a state of putrescence. People went on for years without paying any attention to the state of the filter.

Mr. C. Estcourt, city analyst of Manchester, read a paper 'On the Pollution of the Air', which is published *in extenso* in the *Sanitary Record* of September 15.

Dr. Phené read a paper on the sanitary results of planting trees in towns. He described the latest scientific experiments on the oxygenating property of trees, from which he said most beneficial results were manifested, and from which it was evident that the presence of fresh green foliage was a prime condition in the health of a dense urban population.

Mr. C. T. Kingzett contributed a paper on 'The Eucalyptus and the Pine', considered in relation to their sanitary properties. It had been abundantly proved, he said, that malaria could be entirely stamped out, even in the worst districts, by planting the eucalyptus in proper numbers.

Miss Becker said the chief difficulty in this matter lay in the fearful condition of the atmosphere by reason of the smoke and the chemical vapours. In this the Manchester Corporation were the greatest offenders. Their gasworks at Gaythorn were exceptionally offensive, and the offence given was needless.

The following resolution was passed :—'That this Section suggests to the Association the desirableness of their impressing upon the Manchester Corporation, and those of other towns, the importance of their paying increased attention to the cultivation of trees within their boundaries, as having a valuable bearing not only on the beauty of towns, but on the health of communities.'

Dr. Drysdale (senior physician to the Metropolitan Free Hospital), in a paper on the 'Comparative Mortality of Rich and Poor', argued from statistics that the real cause of the non-effect of the countless hygienic advances on the death-rate was indigence.

INTERNATIONAL CONGRESS OF MEDICAL SCIENCE: BIENNIAL MEETING, HELD AT AMSTERDAM, SEPTEMBER 1879.

SECTION V.—PUBLIC MEDICINE.

THE general meetings were held under the presidency of Professor Donders; Mr. Lister and Mr. Ernest Hart being Honorary Presidents of the Congress for England.

The arrangements for this section of the Congress were made by the following gentlemen :—Dr. Van Cappelle, Dr. Egeling (of The Hague), Professor Van Overbeek de Meijer (of Utrecht), Dr. Penn, Dr. Texeira de Mattos, and Dr. Zeeman. The provisional bureau was formed by Prof. Van Overbeek de Meijer as President, and Dr. Blooker and Dr. J. G. M. Hanlo as Secretaries.

The first ordinary meeting took place on the 8th Sept., at 9 a.m., and was opened by Prof. V. Overbeek de Meijer. The provisional bureau was approved of by acclamation, and the following gentlemen were appointed Honorary Presidents, viz.: Dr. da Silva Amado (of Lisbon), Dr. E. R. Perrin (Paris), Dr. J. Palasciano (Italy), Dr. F. Mouat (London), Dr. Janssens (Brussels), and Dr. Finkelnburg (Berlin).

M. Carsten laid on the table a report upon Animal Vaccination.

M. Grosz de Cszatár made some remarks upon the re-building of the town of Szegedin (Hungary), which was lately destroyed by inundation, and referred specially to the hygienic questions involved.

Dr. Zeeman (of Amsterdam) read a paper entitled, 'How can the State of the Public Health be Measured?' in which he formulated the following conclusions: 1. In order to obtain a measure of the health of a community, it would be desirable to adopt, as the unit of social life, the *family* rather than the *individual*. But, in view of the data actually at our disposal, we must, for the present at least, restrict our observations to the life and health of the individual, as that is the only plan, in the meantime, by which we can obtain data susceptible of being submitted to calculation by numerical values. 2. In order to be able to compare the health of the community in different countries and at different times, the measures adopted ought to be susceptible of precision and also of general application. 3. The means which have been employed as measures of the health of communities have been the following: *a.* The mortality of children in the first year of their life; *b.* The general mortality at succeeding ages compared with the population living at those ages. Tables of mortality—mean duration of life; *c.* Statistics of diseases causing death, with reference to susceptible ages and to epidemic diseases, the declaration of which is obligatory; *d.* Statistics of mortality and sickness of soldiers; *e.* Statistics of public help in sickness (*i.e.*, hospitals, etc.), of lunatic asylums, prisons, etc.; *f.* Tables of sickness of benefit societies; *g.* Physical examination and measurements of recruits; *h.* Physical development of children and young people up to adult age; *i.* Produce of labour, fertility of women. 4. From a critical point of view, we may classify the means employed in three categories: A. Official statistics. These best fulfil the requirements of universality, but their precision is defective when we wish to introduce data resulting from medical observation; B. The current of observation in daily practice, an active but irregular current, which is temporarily strengthened by epidemics, and which requires to be regulated by official rules, and to be utilised by publicity; C. The results already obtained, or that may hereafter be obtained, by a series of exact methods, which may be included under the general name of *anthropometry*. Those methods fulfil, in the most favourable way, the double requirements of precision and universality.

With reference to the above paper, M. Janssens explained the method employed in the physical examination of the school children at Bruxelles.

M. Palasciano, spoke on the question of applying the pneumatic system of drainage to towns, on the necessity of sanitary inspection of railways in course of construction, and on animal vaccination. On this last point a discussion took place, in which Drs. Drysdale, Carsten, V. Cappelle, Crocq, Mouat, and Palasciano took part.

Dr. Clifford Albutt (of Leeds) then read a paper upon 'Infant Mortality and Premature Death'.

Dr. F. Seelheim (of Utrecht) read a paper entitled, 'How far does the Duty of Public Authorities extend as regards the Inspection of Articles of Food?' The following were the conclusions formulated :—1. The Government is bound to have enactments passed for punishing the wilful addition of hurtful substances to articles of food. But as those cases are extremely rare (?), samples of the articles required for examination must be procured, either by purchase or by seizure after complaint made. In order to justify a seizure in a shop, the intention of fraud must be demonstrated. 2. The inspection of butchers' meat ought to be more severe than it has hitherto been, as it is said that the flesh of diseased animals that have been slaughtered, or even of those that have actually died of disease, is often sold as food. 3. The unintentional addition of hurtful substances ought not to be the subject of inquiry, except when the sanitary authority has declared that the additions are hurtful (!). 4. The sanitary authority ought to issue as clear instructions as possible as to the method of examining articles of food, with respect to their quality. A special commission should be appointed for the purpose. 5. The sanitary authority of each province ought to establish an office for the examination of articles of food, and of everything that has relation to that subject. The public should be at liberty to avail themselves of such office on payment of fees accord-

...ng a fixed limit. It might be the duty of the local authority to determine and define offensive additions or alterations, and reserve sanctions if altered, but he did not see how it could be made necessary to make mention of the same in every or any case. It did not, however, be considered indispensable that penalties should be inflicted for such additions. Drinking-water had to be considered as an article of food within the meaning of the law. A somewhat animated discussion followed the reading of the paper, in which Drs. Mouat, F. Crace-Calvert, de Meijer, Kraus of Vienna, van Overbeek de Meijer, Cesare Depaile, Janssens, Brussels, de Valde, and Ipenheim took part. Objections were taken to many points in the paper, as for instance the necessity of giving notice of fraud before an article could be seized, and of waiting for the decision of analysts of the sanitary authority before imposing upon the unintentional addition of useful substances. The extreme minuteness of the proposals with reference to ordinary substances, including deterioration in value as for example, watering of milk or skimming cream therefrom, excited much opposition, it being pointed out as an example, that the addition of water to milk or other diminution of its nutritive value would be as actively dangerous to children or persons whose chief nourishment depended upon it, as if an acknowledged hurtful substance were introduced. The general opinion was that all kinds of falsification should be punished, and that the onus of proof of innocence of intention should rest on the vendor, who should have his remedy against the wholesale dealer who supplied him. One instance of difficulty was cited in the case of Holland, where at one time a cargo of anise-seed was entered at one of the ports. This, on being examined, proved to be very largely adulterated with *hemlock*. Nevertheless, a seizure could not be effected, because the law specified *food* only, and adulteration was recognised only as a drug. Dr. Mouat pointed out that by the 'Adulteration of Food and Drugs Act,' as well as the later Act of 1879, provision was already made in England for everything proposed in Dr. Ipenheim's paper, as well as for the further points demanded by the generality of the session.

Dr. Drysdale then read a paper, 'On the Mortality of Rich and Poor.' His contention was that the great cause of the higher mortality among the children of the poor is insufficient nourishment, arising from poverty, and that all other sanitary measures must necessarily fail until that is removed. His proposed remedy was restriction of the number of children, according to the principles of the Neo-Malthusians, and he cited the French as the only nation who had done this systematically, and whom he therefore considered in the van of civilisation. The plan for restriction consists in early marriage with voluntary restrictive measures, in contradistinction to late marriages (as proposed by Malthus), which lead to prostitution.

M. V. de Luc read a paper upon the arrangement of classes in primary schools from a hygienic point of view, so as to ensure a healthy condition, with proper supervision and instruction.

M. Chervin read an address on the importance of *demography* in medical science. He explained that by this term was meant the various data referring to populations in their widest sense. He mentioned that some opposition to the name had arisen on account of its resemblance to *demonology*, and that biography 'from life' people had been proposed instead: but this name had not been well received. M. Janssens (of Brussels) exhibited some charts of districts in Belgium, and pointed out what was being done in that country. M. van Overbeek (of The Hague) read a paper entitled 'On the choice of Potable Waters in the interest of the Health of the Community.' The following were the conclusions: 1. In the interest of the health of the community, potable water ought to contain neither ammonia nor nitrous acid, constituents absolutely hurtful. Potable water may contain a certain quantity of organic matter, nitric acid, lime, chlorine, and sulphuric acid, substances relatively harmless. 2. In order to generalise the practice of chemical analysis, the colorimetric method ought to be preferred to all others. 3. The knowledge of the physical properties of clay and loam facilitates the search for pure potable water, and also enables us to ensure and preserve its purity.

M. van Overbeek exhibited a small box of apparatus for the colorimetric examination of water, arranged with the view of enabling an analysis to be made rapidly.

A discussion followed, in which Dr. van Overbeek de Meijer, Dr. F. de Chaumont, Dr. Janssens, Dr. Van de Velde, M. Sanders, Mr. Ernest Hart, and Dr. da Silva took part. The wording of the conclusions, especially in the first clause, was strongly objected to, and it was pointed out that neither ammonia nor nitrites acid were in themselves injurious, but were objectionable only as indications of the probable presence of putrefactive organic matter. On the other hand it was the organic matter that was really to be feared. It may be remarked, in explanation, that the object of the clay or loam is for the purpose of acting as an impervious layer, which might be artificially applied for preventing noxious substances reaching the water. The colorimetric method proposed was criticised as being too little and too much. Too little, as hardly giving enough information, and too much, as giving almost as much trouble as a quantitative analysis without the same amount of information.

Mons. Belval of Brussels) read a paper 'On the International Organisation of Public Hygiene', the object of which was to urge an accordance of view between different nations as to the steps to be taken to ensure the maintenance of public health.

A discussion followed, in which MM. Jäger, Finkelnberg, Israëls, Mouat, Van Capelle, Perrin, Crocq, and Palasciano took part, at the end of which M. Jäger (Amsterdam) proposed to appoint a commission to furnish a report upon this point (on the basis of the conclusions of the Congress of 1875) to the next meeting of the section. The members named were MM. Belval (of Brussels), Finkelnburg (of Berlin), Mouat (of London), Palaciano (of Naples), and Van Capelle (of The Hague.)

Mr. Ernest Hart then delivered an address, in which he gave an account of the various typhoid epidemics apparently propagated by milk in England. He entered into the details of several of the most remarkable, and mentioned that in all *thirteen* had been noted, and more or less clearly traced out. He then described the precautions taken to secure the purity and harmlessness of milk, as exemplified in the case of the Aylesbury Milk Company, for which he had himself drawn up the rules, which had been carried out with great success.

Dr. von Overbeek de Meijer (Utrecht) read a paper on the following subjects: 'By what means can governments defend Populations against Contagious Epidemic Diseases?' The following were the conclusions of the paper: 1. An excellent means of combating pandemics is to attack them at their focus. The governments of civilised nations ought to combine together for such attack, and, should a nation wrongfully withhold its co-operation, the governments of other countries ought to surround the refractory country with a double and triple cordon of posts of sanitary observation. 2. The best means of removing from any soil the properties favourable for the development, conservation, or multiplication of disease germs is to dry it and purify it. 3. The individual susceptibility of the poorer class to disease ought to be diminished by ameliorating the general conditions of their existence. It is dangerous, both for the individual and for the public to take advantage of a mild epidemic by exposing oneself deliberately to contagion, in order to acquire immunity in future epidemics. Vaccination ought to be recommended only so long as vigorous measures against the transmission of virulent maladies have not yet been ordered and carried out by the authorities. We have no right to impose vaccination, even if we only demand inoculation with animal vaccine, because it strikes at every one, whereas we may attain the same object by isolation of those attacked with small-pox. Besides, compulsory vaccination has nowhere fulfilled what was expected of it, because non-fulfilment of the law has been punished too leniently, and because revaccination has not been insisted upon. 4. The hygienic measures known as simple quarantine or quarantine of observation are only admissible when the country that we wish to protect against epidemic invasion is an island, or when it presents exceptional conditions, which render it possible to guard effectually all avenues of access. Quarantine of observation, such as is now imposed in Europe, offers only an insufficient guarantee of success. On the other hand, the rules of the old 'strict quarantine', in so far as they deal with the complete isolation of persons manifestly infected, or who show premonitory symptoms, ought to be uniformly applied in every case and on all frontiers. If the sanitary police of the country we wish to protect is well organised we may allow individuals to enter who belong to an infected group, but who themselves present no symptom of disease; but those persons should still remain for some time under police surveillance. If, on the other hand, the sanitary police is badly organised, as it is almost everywhere, Holland included, then we must resign ourselves to the necessity of retaining the entire group on the frontier, separating actually sick from doubtful cases, and these again from those manifestly healthy. The transport of persons attacked by contagious epidemic disease without special authority, and except in urgent cases, as well as the transmission of contaminated articles, ought to be forbidden by an international convention, under pain of fine and imprisonment. 5. Within the frontiers every person attacked with contagious epidemic disease ought to be notified to the authorities, either by the medical attendant or by the head of the infected family. He ought to be immediately isolated, either in a hospital set apart for the purpose or in the house or vessel where he may happen to be. Those who have lived with him may leave, but they must remain under police surveillance. If they elect to remain beside the patient they must share his isolation. The authorities ought to draw up rules for isolation, disposal of the dead, and disinfection. They may also, in case of need, close the dwelling temporarily should it be an hotel, a school, or a place of public meeting. 6. For efficient disinfection of an inhabited air space, whether the inmate be sick or well, no means are known. We can only have recourse to scrupulous cleanliness and free ventilation. As disinfectants of inanimate objects the following may be recommended. Drying at a very high temperature, above 210° centigrade (410 Fahrenheit), continuous boiling at a temperature of over 130° centigrade (266° Fahr.) for at least two hours, continuous fumigation (for six to eight hours) with superheated steam above 266° Fahr., or with sulphurous acid, equal to 1 or 2 per cent. of the volume of the air space, followed in every case by the most copious washing and scrubbing, and the freest and most continuous perflation. Articles incapable of standing such disinfection ought to be destroyed by fire or buried in the cemeteries. At the same time it would be almost impossible in practice to carry all this out completely. Disinfection ought to be applied everywhere, according to plans which should be carefully considered and made as uniform as possible. 7. When an epidemic is actually raging in a dense population, the authorities generally find themselves unable to make head against it. The authorities, assisted by volunteers, ought then to bring help and support, both material and moral, to the suffering households. Temporary emigration from an infected district ought to be encouraged; but it is the duty of the authorities of non-infected districts to impose upon the fugitives the strictest measures of quarantine of observation. M. Finkelnburg (Berlin) opened the discussion by protesting against the views of the author on the subject of compulsory vaccination. He cited the terrible ravages of small-pox in the pre-vaccination period, and the extraordinary diminution in mortality which has taken place since. He strongly supported revaccination, and pointed to the excellent results obtained in the German army, where small-pox may be said to be non-existent. M. Warlomont (Belgium) strongly supported compulsory vaccination, urging at the same time that vaccine lymph direct from the calf should be resorted to as much as possible.

Dr. F. de Chaumont strongly supported the two previous speakers, insisting upon the necessity of vaccination and re-vaccination as means of stamping out the disease. He also protested against a return to the old oppressive measures of strict quarantine, arguing that a quarantine of observation is really all that can be demanded or even carried out. For further protection, it is the duty of each country to look to its own internal conditions, and to make its hygienic condition so perfect that it may face the threatened invasion of epidemics without fear. Strict quarantine, in its fullest sense (the only sense in which it can be defended) is absolutely impossible in Europe—and any attempt to enforce it would be intolerable—it would paralyse trade, and produce worse evils than those it was intended to prevent. On the subjection of disinfectants, the speaker pointed out the inefficacy of nearly all the ordinary so-called disinfectants, but maintained that the temperatures for disinfecting purposes demanded by the writer were unnecessarily high, and would lead to great destruction of material. He agreed that all small articles should be burnt, but urged that a temperature very little over 100 centigrade (212° Fahr.) would suffice, *provided* every

article was thoroughly heated throughout all its parts.

After some remarks by M. Verspijck, M. Crocq (Senator, Brussels) spoke on several points in the paper, among others dissenting from the opinion that it was imprudent to expose oneself to a mild epidemic for the purpose of securing immunity. He mentioned that he had himself taken advantage of a very mild outbreak of scarlet fever to expose his own five children to it. They all took it in a very mild form, and might be considered as proof against future epidemics.

M. van Overbeek de Meijer replied to the objections made, upheld his own views on vaccination and quarantine, and reminded Dr. F. de Chaumont of the experiments of Calvert and others, which tended to show the necessity of extreme temperatures to ensure the complete destruction of bacteroids. [The importance of these experiments has been since minimised by Tyndall's researches, who has shown that repeated heatings to 212° F., with intervals of rest, are sufficient to completely sterilise any solution, by attacking the successive crops of bacteroids at their stage of maximum vulnerability.] Dr. van O. de Meijer further repudiated the views of M. Crocq on the exposure of persons to contagion purposely during mild epidemics, objecting to accept the terrible responsibility of such a course, seeing that we can never make sure of the mildness of any particular case.

At the close of the discussion a motion was made by M. Warlomont, seconded and amended by M. Finkelnburg, and unanimously adopted, to the effect: 'That this section is of opinion that compulsory vaccination is necessary for protection against small-pox; that re-vaccination ought also to be enforced; and that animal vaccine lymph ought to be used as much as possible, in preference to arm to arm vaccination, as usually practised.'

M. Delaunay (Paris) spoke on the question of international measures which ought to be adopted for the suppression of small-pox. MM. Crocq, Zawerthal, Hertz, Sanders, and Delaunay took part in the discussion.

M. Zawerthal then read a paper upon the introduction of courses of instruction in the hygiene of the voice into the 'Conservatoires de Musique'.

The Report of M. Finkelnburg, in the name of the Commission appointed at the last sitting was adopted. The conclusions were on the basis of the recommendations of the Congress of Vienna.

The chief paper read was by Dr. Krauss, of Vienna—'Arrangements for Suppressing Venereal Disease'.

Besides the papers actually read in the section, others were announced, two of them being read in the general meetings, viz.: 'On the Regulation of Prostitution and Public Health', by Dr. Drysdale, who objected to the repressive measures now in operation in many countries, but his views were not generally accepted. Drs. Landowski and Palasciano and Mr. E. Hart took part in the discussion. Also, 'On the Protection of Childhood against Premature Work', by M. S. van Houten (of The Hague). The conclusions of his address were the following:—1. Both legislation and custom ought to place a check upon the excessive competition which tends to lower the cost of production in those cases where such diminution is only to be obtained by the sacrifice of the health and intellectual development of the producers. 2. All that the legislator can do is to draw up general rules for organising work on the principle above enunciated; workmen's guilds and trades' unions will have to work out the details. 3. At the same time, the said principle can never be completely realised until the maxims of the Neo-Malthusians are generally accepted, viz.: restriction of the increase of population without renouncing conjugal duties.

The remaining papers presented to the section were:—'Pathogenesis and Prophylaxis of Phosphorus Necrosis', by Dr. Magitot (Paris); 'Psoriform Eruption among Workmen who handle Barley', by Dr. A. Manouvriez (Valenciennes); 'On a New Edition of the Atlas of Mortality published by the Dutch Medical Association', by Dr. H. van Cappelle (of The Hague)—[Copies of this atlas were presented to the members of the Congress by the courtesy of the Association]; 'On the Measures to be adopted against the Plague'; 'On the Organisation of the Medical and Sanitary Arrangements on the Hungarian Railways', both by Dr. Louis van Grosz (of Buda Pesth).

On Thursday, the 11th September, the 'Association Internationale pour l'eau Potable' held a preliminary meeting in the room of the hygienic section, Mr. Edwin Chadwick, C.B., Honorary President, in the chair. M. Jäger (of Amsterdam) vice-president and founder of the society read a report on the steps which had been taken up to that time. The association was founded last year in Paris, on the occasion of the International Congress of Hygiene, and has in view the desirability of rousing the attention of governments and local authorities to the importance of securing for the people a pure water supply, and, further, of securing if possible some kind of international co-operation towards that end. M. Jäger referred in feeling terms to the loss the association had sustained by the death of its president, M. Gubler of Paris, who had taken a keen interest in its working, and had ardently supported its object. An address was then read by Dr. Mouat on behalf of Mr. Chadwick, in which the veteran hygienist gave an interesting sketch of the progress which had been achieved in England in the direction of the society's work during the present century, many interesting details of which he gave from his long and valuable experience. This meeting, which was numerously attended, was intended as merely *ad interim*, the first official general meeting of the association having been arranged to take place at Turin in 1880, on the occasion of the biennial meeting of the International Congress of Hygiene.

(To be concluded.)

MEETING OF THE GERMAN PUBLIC HEALTH ASSOCIATION AT STUTTGART.

THE seventh meeting of the German (Public Health) Association was held in Stuttgart from the 15th to the 17th Sept. (inclusive). Privy Med. Counc. Prof. Dr. A. Hirsch, from Berlin, gave an address on 'the best means of warding off epidemics, with reference to quarantine and cordons'. The following are the conclusions at which he arrived.

A. *General Rules.*—1. It is one of the most important tasks of public hygiene to aim at establishing certain rules which will prevent the importation of epidemics from foreign countries, the most important of these epidemics being the Oriental plague, cholera, and yellow fever. 11. These three epidemics belong to the class of contagious infectious

diseases. Each of them originates in an extra-European country, from which the specific virus has been brought into other countries by means of things or persons, where, under the influence of certain peculiar temporary and local conditions, it develops and finally causes the disease to spread. III. The following three points must therefore be specially kept in view: 1. The epidemic must be exterminated in its birth-place; 2. Care must be taken to prevent the disease from being imported from those countries where it has originated primarily, and where it has become endemic, into neighbouring countries; 3. The virus must be destroyed wherever it has penetrated; 4. All the conditions must be avoided which might have a favourable influence on the development and spread of the disease. IV. It will only be possible to fulfil the first desideratum when we have learned the nature of the virus and the sources whence it is derived. The second requisite can be carried out by preventing all means of communication by laying an embargo on trade and instituting quarantines. Where this is not feasible, the frontiers must be carefully watched, especially in the exposed districts. The third point will be carried out by disinfection by means of ventilation, high temperature, or such chemical agents as are known to exercise a destructive action on organic matter, or to check organic processes. The fourth part of the task requires constant supervision and regulation of all sanitary measures which prevent the virus from taking root in such soil that would be favourable to its development (draining the subsoil of inhabited localities, removing the refuse and waste material, keeping the streets, courtyards, and houses, etc., clean), or that would heighten the resistance of the organism against the effects of deleterious influences by lowering as much as possible the individual predisposition to disease.

B. *Cordons and Quarantines.*—I. The best method of preventing the invasion of epidemics from neighbouring countries is by entirely suspending all communication between the infected country and the country which has to be protected. However, this aim can only be attained under the following conditions: 1. All means of communication must be entirely cut off, so that the epidemic cannot, either directly or indirectly, invade the country that is being protected; 2. The embargo must be kept up till the epidemic has completely disappeared at all points whence it might have penetrated into the country; 3. This is only feasible when the isolated district is so independent of all communication with the infected country that its inhabitants will not suffer from a complete interruption of intercourse. These conditions are only given in very exceptional cases (*e.g.*, in islands which have no international traffic, or where the population is not dependent upon it for its existence. As a rule, therefore, it will only be practicable to restrict the communication, and this has been done. II. By protecting the frontier by means of a cordon, and establishing quarantines at the principal points of ingression. Although these measures appear rational, *à priori*, they are practically very difficult to carry out (*e.g.*, the difficulty of keeping up the cordon, or of preventing its being broken through, our limited knowledge of the stage of incubation of the disease, and the vehicles of the virus, the interruption of the traffic, which causes great damage to the material welfare of the population, etc.) The immunity they afford against contagious diseases is comparatively less great than might be expected; at the same time, they are very costly. The Government would therefore only be justified in putting them into practice where it is evident that the result will be a favourable one, and where the damage done by the interruption of traffic would be outweighed by the result. III. The prohibition of traffic by land, combined with quarantine, should be rejected as a worthless measure (being deceptive and difficult to carry out), and as dangerous to the public welfare, by impeding the traffic. It must be superseded by a strict medical supervision of the towns and villages that are situated on the frontier. This superintendence must extend far into the country that has to be protected. In places where the said localities are more or less isolated, and where there are few modes of communication with the infected neighbouring country, the result will be a favourable one. IV. A more efficacious measure would be to draw a cordon along the sea-coast and to establish quarantines in the seaports, as the communication is more easily superintended here, and the cordon is not so easily broken. Still this protection remains only a comparatively safe one, and is connected with great sacrifices. Therefore, these means are only justified: 1. In cases of yellow fever, which is imported only by way of sea-traffic. It would therefore be advisable to institute a sea quarantine, whenever this epidemic reigns in the western hemisphere, in all European seaports that are in direct communication with the infected localities, and whose meteorological and climatic conditions are such as to favour the bringing in of the epidemic and its further spreading. The quarantine must be kept up during the whole time of danger; 2. In cases where an epidemic of plague or cholera threatens to invade the European continent or the islands belonging to it, quarantine must be established in the seaports most exposed to the danger, and so near the infected countries that the time taken by ships coming from them is shorter than the stage of incubation of the said affection would be; 3. In cases where the plague appears on European soil. The experiences of the last twenty years have taught us that it is necessary to establish quarantines for the ships coming from the infected regions, and to maintain them as long as the localities that are situated in the neighbourhood of the seaports and are in direct communication with them, have remained free from the infection. Sea quarantines are of no avail in cholera, when the epidemic has once reached European soil, as it is well known that the disease spreads more rapidly on the dry land than on the sea. The inconvenience and damage caused by the stoppage of traffic would not be compensated for by the results obtained from these measures. Owing to this fact, maritime quarantines against cholera have been almost entirely abolished during the last ten or twenty years in the northern sea-coasts of Europe, and especially in Germany. But in order to prevent the disease from being imported into the seaports, the sea traffic must be regulated and superintended according to the rules that were laid down at the meeting of the Sanitary Commission in Vienna, 1874, wherever communication exists between the infected and healthy seaports specially, as long as the epidemic has not spread to the coast itself. V. Persons arriving by ships from infected countries must be submitted to a strict quarantine. The cargo and personal property of the crew and passengers must be strictly disinfected and cleansed, and, in cases of yellow fever, the ship also. Property or things that have been used in infected countries and are destined

[illegible] for sale of districts that have remained free from the latter [illegible] must be entirely [illegible] traffic during the epidemic and [illegible] has ceased. The other [illegible] The question relating to the proper measures to be taken [illegible] of plague or cholera from the East must be looked at from a more general point of view than has been the case; for it must be remembered that of international congresses and [illegible] European state has the same interest [illegible] all are more or less equally [illegible] to whatever affords protection to [illegible] itself to all. The European States [illegible] protection against the epidemics [illegible] from the East, not so much by quarantines and cordons as by: 1. A constant [illegible] of the sanitary conditions in the East; 2. [illegible] a well-organised body of sanitary [illegible] those points and localities whence the [illegible] epidemics plague and cholera have [illegible] to penetrate into Europe, or that are [illegible] to; 3. By establishing and carrying out in the aforesaid localities [illegible] of quarantine and sanitary cordons. [illegible] measures can only be carried out by [illegible] agreement on the part of the European [illegible] throw their whole authority into the [illegible] The first step towards the solution of this [illegible] so important for the welfare of Europe [illegible] made by establishing an international European board of health, which is composed of [illegible] and municipal officers. Their duties [illegible] consist: 1. In exercising a continuous control over the sanitary conditions in the East, either with the aid of such international local sanitary authorities as have already been established, or are to be so in future, or by appointing special [illegible] to be sent to the place in question: 2. In drawing up a programme of all the measures which have to be taken whenever plague or cholera break out in the East and threaten the welfare of Europe, pointing out those particular localities where constant quarantines ought to be established, and in considering the best way of managing them. These suggestions must be submitted to the respective Governments, and after the conditions have been agreed upon, their fulfilment must be watched over by the officials which have been placed at the disposal of the international sanitary board. The cost of the establishment and maintenance of the said quarantines will have to be borne by the respective Governments, as this is a cosmopolitan institution; 3. The arrangements of the quarantines must be conducted on a uniform and humane principle in all those European seaports where lazarets exist, or are going to be established, either for reasons which are universally valid, or because the Government has deemed it necessary; 4. They must study the origin, mode of contagion, and character of the disease, in order to obtain a more secure foundation on which to build the different prophylactic means than the present state of our knowledge affords. It would therefore be well if the German Association for Public Health would present to the German Government a petition asking that, if it could appreciate the importance and object of an international sanitary association organised in the aforesaid manner, it might prevail with the other European Governments towards establishing it.

II. *On Measures for Disinfecting, by Prof. Hofmann.*—1. The present state of the question on disinfectants seems to imply less the necessity of discovering new disinfectants than that of making a more suitable use of those that are already known. [illegible] can only be said to have been really [illegible] when the following conditions have been fulfilled: 1. By considering the object or poisonous germ which is to be destroyed: 2. By considering the place or object where the poisonous germ may be found or must exist: 3. By a thorough knowledge of the mode of action and the qualities of the disinfectant that is being used.

[illegible] *Boarding- and Lodging-Houses.*—1. Anyone who intends to take in boarders or lodgers for payment must apply for a licence to the local magistrates; 2. Lodgers are bound to declare within two days where and what kind of lodgings they have found, under penalty of the right to leave them; 3. The permission to keep a boarding- or lodging-house must be given only to persons of good character, with the condition that the rooms that are to be used for the aforesaid purposes are situated in a house which is situated in a healthy locality, and that the following conditions are fulfilled: 4. The lodgers' rooms must not be in open communication with the apartments of the lodging house-keeper. They must not be situated either in the cellar or under the roof. They must have sufficiently large windows which will open, have a wooden floor, and have a fireplace. Iron stoves must be separated from the neighbouring beds by guards: 5. Every lodger must have a space of at least ten metres of air, and a minimum of three square metres of floor. Where more than one lodger is taken, the maximum number of persons that can occupy the room must be marked over the door in plain writing; 6. Closets and urinals must be erected outside the house, and the cesspools lined with masonry, if there are no water-closets in the house; 7. The staircases in boarding- and lodging-houses that contain over ten sleeping places in the floors above the ground floor must be made of fireproof material; 8. Lodging-houses that contain more than five beds must have a well belonging to them with a plentiful supply of drinkable water, if the latter is not laid on in the house; 9. The lodging-house keeper is bound to deliver to each of his lodgers at least a palliasse, a woollen counterpane, and two clean sheets, as well as the necessary articles for washing, water and one towel weekly. Lavatories ought not to be tolerated; 10. The same lodging-house keeper must not be allowed to let his rooms to both men and women. Children under fourteen years of age must not be taken in; 11. It is the duty of the lodging-house keeper to take care that the rooms are daily swept and aired by opening the windows. The floors, stairs, landings, or passages must be thoroughly scrubbed once a week. Twice yearly, in April and October, the furniture must be moved out of the rooms and the walls and ceilings whitewashed and thoroughly cleansed; 12. It is the duty of the lodging-house keeper to inform the police, without delay, of any case of serious illness that should occur, in order that the illness may be diagnosed, and the patient eventually removed to a hospital; 13. The police are authorised to visit any rooms that have been let to lodgers or boarders, either alone or together, with the local medical officer, at any time, both by day or night; 14. There seems to be no occasion, at present, for any special hygienic demands on the public dormitories, etc., which have been erected by local boards, private individuals, or companies, if

they fulfil the above conditions. Such establishments must be in every way encouraged and aided. Any defects that may be detected later on will have to be remedied by the inspecting boards.

IV. *On the Want and Construction of Mortuaries, by Dr. Flinzer and M. Zenetti.*—1. The general establishment of mortuaries is to be encouraged from a sanitary point of view. II. Mortuaries must be adapted to the local conditions. The most suitable place for them being the churchyards or their immediate vicinity. III. The bodies in the mortuaries ought to be laid out in large halls, instead of in cells. The halls must be so arranged as to fulfil the demands of hygiene, while at the same time the feelings of the friends of the departed are spared as much as possible. This can be done by decorating them in a tasteful manner.

V. *On Public Baths, by M. Runge, Architect.*—1. Does the enormous disproportion which exists between the amount of moisture contained in the air of the tepidarium and sudatorium in the Turkish bath, and is especially apparent in our climate, and during the colder part of the year, and remains almost unnoticed in many Turkish bath establishments in Germany, have any favourable effect on the skin and respiratory tract? Is it desirable to add to this dried air a degree of moisture which corresponds to its temperature? II. In the latter case, what would be the best method to equalise the amount of moisture in the air, even where want of space might render it impracticable to construct a tepid water reservoir? Would not the admission of steam, as it does not cool the air, be the best, simplest, and most effective method?

MEDICAL OFFICERS' REPORTS.

WATFORD.—Dr. Brett's report for 1878 is brief, but to the point. The death-rate for the district was, even at the most favourable estimate, high (19·0 per 1000), and zymotic diseases were much more prevalent than in 1877. This increase is chiefly due to the fatality from whooping-cough, but scarlatina, diphtheria, and croup were also more prevalent. There were seven cases of small pox (four imported), and one death. It is satisfactory to learn that the building of an Infectious Hospital has been decided upon, and that the supply of water is about to be increased. The flushing of the drains might receive more attention than it does.

BRYNMAWR.—Mr. Skrimshire's report is not only very readable, but it gives a most useful account of the present sanitary conditions prevailing in the district—a point always important to be observed. Brynmawr appears to have fallen upon hard times during the present depression in the coal trade, and no less than 20 cases of relapsing or famine fever are recorded as having occurred during the year. Considering the misery to which many of the inhabitants are reduced, through the scarcity of work and the consequent low wages, it is only surprising that the death-rate is not higher than 20 per 1000. There were several isolated outbreaks of scarlatina, three deaths occurring therefrom. Whooping-cough was rather prevalent, and some six cases of typhoid fever were brought under notice. As might be expected amongst a mining community there are always a great number of cases of phthisis in the district. The water supply has not failed as regards quantity, but on occasions it was of a dark brown colour, from a neighbouring bog. The drainage system is reported to be in thorough and regular working order.

GLOUCESTER.—During 1878, the number of deaths registered in this city was 728, which, in an estimated population of 36,557, yields a death-rate of 20.02 per 1000. Mr. Wilton does not give any particulars as to the circumstances under which the deaths from zymotic diseases occurred, and we are thus unable to gather why only one case (and that of small-pox) was received into the City Infectious Hospital during the year. Especially as regards the nine deaths from scarlatina, and the 12 deaths from enteric fever, it would have been important to know the circumstances of their occurrence. The connection of houses with the city system of water supply is being satisfactorily carried out, and during the year 334 houses were connected with the city drainage. In view of these improvements, it behoves the Authority to consider at once the question of providing an additional supply of water for the city. The slaughter-houses, bakehouses, skin depôts, and lodging-houses, seem to be in a satisfactory condition.

LEAMINGTON.—The health of this important watering-place is of more than local concern, and it is satisfactory, therefore, to have, in the last report of Mr. Baly, a favourable account of sanitary progress. The death-rate for 1878 was 17.9. This is higher than that for either 1876 or 1877; the increase being chiefly caused by the deaths from infantile diarrhœa in the summer months. Including 22 deaths from diarrhœa, 34 fatal cases occurred from diseases of the zymotic group. An immense improvement has lately been effected in providing a new water supply from an artesian well, sunk to a depth of 112½ feet in the new red sandstone. This water is exceptionally pure, and is practically inexhaustible. Seeing that there are many shallow (and polluted) wells still existing in the poorer parts of the town, it is to be hoped that steps will be taken at once to extend the new supply to every part of the town. The flushing of the closets seems to be susceptible of great improvement, and the Town Council certainly want a bye-law to deal with the very considerable nuisance that appears to arise from the keeping of pigs.

LLANELLY RURAL.—There is not so much information in this report as could be desired with regard to the sanitary conditions prevailing in the district, nor as to the improvements which have been effected therein. There is enough to show that Mr. Thomas is energetic in the performance of his duties; but we would suggest to him that the report might be made more generally valuable if information of this kind were given in it. The number of births for 1878 (905) showed a considerable falling off, the rate being the lowest since 1869. This is doubtless due to the depression of trade in the district. The deaths amounted to 452, equivalent to a rate of 18.9 per 1000. The deaths of children under five years constituted 38.2 per cent. of the total. Zymotic diseases caused 60 deaths, the mortality being principally from whooping-cough (20 deaths) and typhoid fever (24 deaths). The latter was widely distributed, and scattered cases occurred throughout the district. Sanitary work is apparently very energetically carried out.

PENRITH RURAL.—The death-rate of this district for 1878 was low (13.4 per 1000); but there are some unsatisfactory features in the statistics, notably the large number of illegitimate births and of uncertified deaths in the district. The proportion of illegitimate to the total births was 8.7 per cent. in 1878,

and no less than 48.2 per cent. of illegitimate children died before they reached the age of one year. During 1878, 21.6 per cent. of the total deaths were uncertified by any qualified man; and it would seem very desirable that, as Dr. Robertson suggests, the practice adopted at Bristol of holding an inquest in all uncertified cases should be followed in the Penrith district. The proportion of fatal cases of diseases of the zymotic class was very small, and the cases which did occur were on the outskirts of the district. During the year, the water-supply of Langwathly was greatly improved; but there are other villages, notably Skirwirth, Blencairn, Great Selkeld, and Newbiggin, which need immediate attention.

SWANSEA.—The continued depression in the industries of this important town does not seem to have had so much effect on its death-rate as might have been expected. During 1878, 1,386 deaths occurred in the borough, equal to a rate of 21.5 per 1,000. No less than 666 of these deaths were in children under five years of age, and 423 in infants under one year. Whooping-cough is accountable for the greatest share in this high infantile mortality, 106 deaths occurring under five years of age from that cause alone. The seven zymotic diseases caused 193 deaths, equal to a rate of nearly 3 per 1,000. Twenty-one cases of small-pox and five deaths occurred during the year. The sixteen cases that recovered had all been vaccinated. Scarlatina caused nine deaths, typhus fever one, and typhoid nineteen deaths. There were forty-six deaths from diarrhœa, thirty-seven occurring in the third quarter. Phthisis occasioned as many as 132 deaths. The work of nuisance inspection and repression has been steadily carried out, but the Authority ought certainly to see that the complaints made of the laxity of their contractors for house refuse do not again occur, or better, that the work is undertaken by their own servants. It is not satisfactory to read that some five miles of recently constructed sewers are rendered inoperative and useless for want of an outlet, and we trust this state of things will be remedied without delay. The fever hospital of the district, which has been of immense service for a considerable number of years, will soon be unavailable for further use, as its site is required for railway purposes. We regret to learn that there is difficulty in procuring a fresh site, but we hope that Mr. Davies' efforts to convince his neighbours of the absurdity of their objections have already had their effect.

CONGRESS OF THE SANITARY INSTITUTE OF GREAT BRITAIN AT CROYDON.

Order of proceedings.—Tuesday, October 21st, 1 P.M., public luncheon; 3 P.M., Opening of Exhibition, by William Drummond, Chairman, Croydon Local Board of Health.—8 P.M., First General Meeting; Opening Address, by Benjamin W. Richardson, M.D., F.R.S., President of the Congress.—Wednesday, October 22nd, 10 A.M., Second General Meeting.—Section 1. 'Sanitary Science and Preventive Medicine;' Address, by Alfred Carpenter, M.D., C.S.S. Camb, J.P., President of the Section. 11 A.M. to 1 P.M., Papers and Discussions, on 'Sanitary Science and Preventive Medicine'; 2 to 5 P.M., ditto.—8 P.M., Conversazione, at Public Hall, Croydon.—Thursday, October 23rd, 10 A.M., Third General Meeting.—Section 2. 'Engineering and Sanitary Construction;' Address, by Captain Douglas Galton, R.E., C.B., F.R.S., President of the Section.—11 A.M. to 1 P.M., Papers and Discussions, on 'Engineering and Sanitary Construction;' 2 P.M. to 5 P.M., ditto.—8 P.M., Lecture to the Congress, by Professor W. H. Corfield, M.D., Oxon., Professor of Hygiène, University College.—Friday, October 24th, 10 A.M., Fourth General Meeting.—Section 3. 'Meteorology and Geology;' Address, by G. J. Symons, F.R.S., President of the Section.—11 A.M. to 1 P.M., Papers and Discussions, 'Meteorological, Geological, and Geographical;' 2 to 4 P.M., ditto.—5 P.M., Closing General Meeting of Congress; 7 P.M., Public Dinner.—Saturday, October 25th, Excursions. The Lectures to the Congress and the General Meetings will be held in the Large Public Hall, and the Sectional Meetings in the Small Hall adjoining. The Exhibition will be held in a Marquee erected at the Central Croydon Station, and will remain open until Saturday evening, November 8th. Visitors from London will find the route by the South Eastern Railway from Charing Cross, Cannon Street, or London Bridge most convenient. From the Great Western, London and North-Western, the Great Northern, and Midland termini, the Paddington and New Road omnibusses run to London Bridge Station. From the Liverpool Street Station of the Great Eastern Railway an omnibus runs to Cannon Street. The Waterloo Junction of the South-Western Railway affords direct communication with the South-Eastern system. Passengers on the London, Chatham and Dover Railway can change at Ludgate Hill for London Bridge; those arriving at Victoria Station will find omnibusses from there to the Charing Cross Station. We have merely given these hints for the convenience of strangers in London, and have pointed out the most easily found routes from the Metropolis to Croydon.

The particulars given of exhibits are necessarily brief; it will, however, be found, in most cases, that exhibitors are in attendance, or have representatives, to explain the action and uses of the various appliances. In nearly every other instance a prospectus or circular accompanies the apparatus.

Descriptions of the more novel and interesting exhibits, for the information of our readers not attending the Congress, will appear in the SANITARY RECORD for November 15th.

Drying Apparatus for Buildings and Houses.—This apparatus consists of a truck to carry apparatus from place to place, an ash-pan, a hearth, with rectangular iron fenders, filled with coke, and furnished with iron plates, serving as reflectors, of ten tubes of iron plate, capable of being lengthened at will, with lower extremities widened in the shape of a funnel, which can be bent in any direction by means of screw-compress. When the apparatus is heated, the cold and damp air passing across the fire will be discharged of its dampness, and projected very hot against the walls. The number of apparatus used in drying varies according to the size of the house.—Exhibited by A. DREYFUS and Co., 39, Monkwell Street, E.C.

Hospital and Portable Disinfectors.—The Portable Disinfector is for purifying the air of rooms in which infection, sloughing wounds, gangrene, etc., exists, by the continuous generation of a mild stream of chlorine. The Hospital form is for generating a stream of chlorine gas in close proximity to the sewage, and deodorizing and disinfecting the same, and rendering a return current of sewer gas, absolutely innocuous.—Exhibited by WILLIAM SOPER, 283, Clapham Road.

Hygienic Ventilating Stoves.—This stove obviates the difficulties hitherto experienced in warming and ventilating apartments, halls, hospitals, public buildings, etc. By its use a room is warmed equally in every part, and a full supply of pure fresh air is being continually in-

troduced in a warm state, while the inhaled air is being carried off, so that the air of the room is constantly changed, and a perfect circulation maintained. There is the cheerfulness of an open fire, and an absence of all dust; and these combined advantages are gained with, at the same time, a saving of at least 60 per cent., as compared with the cost of an ordinary fire.—Exhibited by the HYGIENIC STOVE AND GRATE COMPANY, Eagle Foundry, Broad Street, Birmingham.

The Cabinet Turkish Bath—Is an apparatus for providing in private houses a perfect substitute for the regular Turkish or Hot-Bath. It is a well made, conveniently-sized cabinet, mounted on castors, and fitted with an adjustable seat and foot-warmer, and is heated either by gas, or an oil or spirit lamp. It constitutes, in fact, a small portable and ventilated hot room, ready for use at any time, at a minute's notice. It is fitted with small doors for the arms, and a book rest in front, so that the short time spent in the bath may be pleasantly occupied. The best guarantee for its answering perfectly the purpose for which it is intended, is the large number of testimonials to its efficiency which the patentees have received, many of them being from well-known gentlemen.—Exhibited by ELLIS AND CO., 42, High Street, Bloomsbury, W.C.

The "Prize" Knife Cleaner.—A cheap and most simple rotary machine, the cleaning surfaces consisting of two felt discs, sprinkled with ordinary emery powder. The knife is inserted between these, while both felt discs revolve. The chief advantages claimed for the machine are cheapness, durability, and the ease with which the wearing substances can be renewed; also that there is no danger of injuring the knives in any way.—Exhibited by ELLIS AND CO., 42, Hart Street, Bloomsbury, London, W.C.

The "Stott" New Patent Self-Acting Gas Regulator.—It is frictionless, imperishable, and the only Mercury tight, self-acting gas valve or governor, ever invented, and by its use a saving of from 10 to 30 per cent. is insured.—Exhibited by JAMES SINCLAIR, 104, Leadenhall Street.

The Bower Patent Sewer Gas Trap.—This trap consists of a pipe passing from the lavatory into a cup, and a branch leads to the soil-pipe. The cup of glass or metal is removable. A solid india-rubber ball floats in the water, which always remains in the trap, up to the level of the branch pipe. This ball closes the pipe leading to the house, and becomes more efficient as a valve, the greater the back pressure. Siphoning out of the trap is impossible. Evaporation is prevented. The trap against entrance of sewer gas under pressure is an improvement on the old form, depending on a water-seal for their action.—Exhibited by JAMES SINCLAIR, 104, Leadenhall Street.

Dick's New Patent Chemical Fire Exterminator.—A portable and self-acting fire-engine. This chemical fire-engine is filled with water, densely charged with carbonic acid gas. It remains charged for years, and is always ready for action. Anyone can use it.—Exhibited by JAMES SINCLAIR, 104, Leadenhall Street.

New Patent 'Main' Supply Water Filter.—Self-cleansing; layers of asbestos are used with animal charcoal, and the density of the filtering medium can be regulated at pleasure, by a screw bolt being attached to top plate. Domestic filters, extincteurs, smoke respirators, and sewer gas traps are also shown. The gas valves, sewer traps, and filters, will be shown in action.—Exhibited by JAMES SINCLAIR, 104, Leadenhall Street.

Patent Conical Ventilators.—These ventilators consist of bricks, grates, and skirtings, perforated with cone-shaped openings, which cause the incoming air to be quickly radiated and diffused, so that all draught is avoided. They have been adopted in a variety of buildings, and have given satisfaction. 'Mr. J. E. Ellison has been awarded a prize medal by the Sanitary Institute of Great Britain for his patent Conical Ventilators, which were selected by the judges at the Sanitary Exhibition, held at Stafford last year, to be further tested. A medal was awarded.—Exhibited by JAMES ED. ELLISON, Victoria Square, Leeds.

Working Model of 'Morrell's Patent' Self-Acting Cinder Sifting Ash-Closet.—For use at gentlemen's houses, workmen's cottages, schools, and public institutions. Ordinary house ashes are used. The cinders are separated from the dust, a sufficient quantity of which is distributed over the excrement each time the closet is used, thus preventing all smell, and producing a valuable manure. By a new arrangement the dust is kept from rising. Is entirely self-acting; over 6,000 in use.—Exhibited by the SANITARY APPLIANCE COMPANY, LIMITED, Factory Lane, Salford.

Improved Patent Duplex Lid, and Automatic Flusher.—These lids or covers to water-closets, sinks, or basins, are so constructed that when shut down they are open to flues, and any offensive gases arising through the soil or waste pipes, or escaping from flaws in the joints thereof, are carried upwards and away to the outer air, instead of entering the room. Moreover, the water-closet lids are so contrived, that the action of shutting them down empties and flushes the apparatus, as in the ordinary manner of lifting the handle, thus rendering harmless the usual upward rush of gas, by conveying it into the ventilating flue.—Exhibited by EDWARD HOWARD, IA, Upper Baker Street, London.

Patent Closed Cisterns, for Water-Supply.—Advantages: purity of water, the water cannot be rendered impure by the surrounding atmosphere, nor by rats, mice, cobwebs, spiders, wood lice, flies, or other matters falling into the cistern. Light and air are excluded. Cannot overflow into the house; constant supply if required; not likely to freeze in winter. The cistern is easily opened for cleansing. The pressure from the main being cut off in the supply-pipe, there is no strain upon the cistern and communicating pipes. The cost is not more than an ordinary cistern, with cover. It answers the requirements of consumers, the Board of Trade, and the water companies.—Exhibited by JOHN CARTER AND CO., 80A, Coleshill Street, Eaton Square.

Earth-Closets.—Apparatus throwing earth, on pulling a plug, similar in appearance to that of a water-closet. Portion of apparatus showing efficiency, strength, and simplicity of throwing parts. One cheaper and one better commode on above principle. Tanks exhibiting larger receptacles than the pails ordinarily used. Apparatus hiding contents of receptacle, on the principle of the water-closet 'cup'. Model of closet, showing arrangement for leaving interior free at all times from intrusion, by attendant filling hopper or emptying receptacle. Model of upstairs closet, showing how it may be attended to from ground floor, without attendant ever entering the house.—Exhibited by MOULES' PATENT EARTH-CLOSET COMPANY, LIMITED, 5A, Garrick Street, London, W.C.

Waterworks Appliances, Fire Extinguishing Apparatus, Bath and Lavatory Fittings, etc.—A small collection of high pressure sluice valves, air valves, standposts, hydrants, etc., etc., for use in connection with water and sewage works. Amongst the hydrants shown is the City of London pattern, also the latest improvement in hydrants, illustrated by the large screw-down hydrant, with tapered waterway and internal water guide; also samples of new designs of valves and cocks, for baths and lavatories, and general water distribution purposes.—Exhibited by J. BLAKEBOROUGH AND SONS, 5, Westminster Chambers, S.W.

Telephones, Electric Bells, etc.—To connect offices or buildings of any kind, so that conversation may be easily carried on by persons who may be from one to 200 miles apart, it is only necessary to run an ordinary telegraph wire from one building to the other, and connect the telephones at each end of the line. No batteries are required in using the telephones, as they are always ready for use, and get better by constant use. A call bell is generally employed to attract attention, and small batteries, which last for twelve months in constant use, are supplied for the purpose of ringing the bells. These electric bells are also supplied for domestic purposes. They may be placed in any part of the house, and so connected by wires hidden in the walls, that they ring by the gentle pressure of the hand upon a small ornamental knob; or they may be connected with the various doors, windows, and

cupboards, so as to ring immediately they are opened.—Exhibited by M. JACKSON AND CO., 65, Barbican, London, E.C.

Pneumatic Sewerage System.—The exhibited drawings, plans, and sections, illustrative of this system, have upon them enough of written and printed description to enable the observer to understand them thoroughly. Besides the diagrams, Mr. Shone exhibits his sewage table, showing at a glance the velocity and quantity of sewage due to various gradients that would be delivered by pipes, varying from 4 inches to 18 inches diameter; also the populations that would be accommodated by each pipe at 2½ and 4 cubic feet per head per diem. The conditions necessary to obtain self-cleansing velocities are indicated by the placing of thick lines under the appropriate figures. —Exhibited by THE MAYOR OF WREXHAM, ISAAC SHONE, C. AND M.E., Pentrefelin House, Wrexham.

Zoedone.—A new, delicious, sparkling beverage, for daily use. A brain and nerve tonic. Each bottle containing the vitalizing phosphatic elements contained in half a dozen oysters, and in an equally assimilable form. Zoedone is specially adapted for those engaged in the active wear and tear of modern life. The patentee is Mr. David Johnson, F.C.S.—Exhibited by RICHARD EVANS AND CO., Wrexham, North Wales.

Straining Gully Trap.—The trap consists of a movable straining box and trap, combined with portable tray, whereby all chamber or culinary refuse is intercepted, to be carried to ash box, keeping drains free from solids or fat.—Exhibited by E. C. BUCHANAN TUDOR, Surveyor, Goole Local Board, Yorkshire.

Well Tubes.—Model fire clay well tubes, for sinking in loose strata, sockets inside perfectly tight joints, preventing the possible contamination of well-water from surface or sewage; requires no puddling; especially suitable for rural districts, or any place where there is no public water-supply.—Exhibited by E. C. BUCHANAN TUDOR, Surveyor, Goole Local Board, Yorkshire.

'Empress' Ventilator.—Two important principles are made use of—the cone exhauster used in many forms of ventilators, and the revolving Archimedian screw. The up-current of air produced by the latter, is assisted by the induced current caused by the cone. Very little air is required to cause the latter to revolve, and if there is insufficient, the cone still acts. This combination of the two forms of apparatus in one, has been highly spoken of by eminent authorities.—Exhibited by EWART AND SON, 346, Euston Road, W.C.

The "Crown" Patent Safety Boiler.—For instantly turning cold water into hot, and producing boiling water within one minute from lighting. Design simple, danger from accident *nil*. Copper and hard solder used in its construction. Heating by atmospheric gas. The water may be used for cooking, cleaning, or for baths. A hot cupboard for warming food or drying linen, is furnished with each boiler. Any plumber or gasfitter can fix the apparatus.—Exhibited by EWART AND SON, 346, Euston Road.

'Empress' Patent Chimney Top.—Revolves rapidly with the slightest breeze, prevents down-blow, makes no noise, cleans itself from soot, and will work for years without attention.—Exhibited by EWART AND SON, 346, Euston Road, W.C.

Patent Safety Gas Baths.—Heated by jets, under the bottom of the bath. New patent atmospheric burner; flame leaves no sooty deposit, and the explosion which sometimes puts out the flame of ordinary atmospheric burners applied to baths, is entirely obviated by a simple self-acting arrangement.—Exhibited by EWART and SON, 346, Euston Road, W,C.

Washing Machine.—A Bradford's Patent 'Vowel' A Steam Washing and Wringing Machine, with pitch pine washing compartment, and improved gear for driving both washing machine and rollers. This machine will wash every kind of household linen. It saves power, soap, and wear and tear. It has decided advantages for the thorough washing and production of a good colour in body linen, etc.—Exhibited by THOMAS BRADFORD AND CO., 140, 141, 142, and 143, High Holborn, London.

Sewer-Air Traps.—Stiff's 'Interceptor' Trap—Weaver's Ventilating Trap (which obtained Certificate of Merit from the Sanitary Institute), and Dr. Hinckes Bird's 'Eureka' Sewer Trap, with several others; also kitchen sinks, in enamelled stoneware, vitrified damp proof course, with continuous ventilating passages are exhibited.—Exhibited by JAMES STIFF AND SONS, London Pottery, Lambeth.

Patent Aluminoferric Cake.—Uses—for clarifying peaty, muddy, or clayey water for manufacturing purposes, and for precipitating and decolorising sewage and the waste waters of dye and print works, tanneries, and other manufactories. Contains 14 per cent. of soluble alumina, or 46.68 per cent. of sulphate of alumina. Analysis of the aluminoferric—alumina, 14.00 per cent. (alum contains 10.8 per cent. of alumina); peroxide of iron, 0.75 per cent.; sulphuric acid, in combination with the above bases, 33.81; free acid, 0.00; water, 51.44. The use of alum, for clarifying muddy or clayey water, is based on the fact that the lime present in the water precipitates the sulphuric acid of the alum, as sulphate, and liberates the alumina; which immediately curdles and carries down the clayey particles, the suspended organic matter, and the dissolved colouring matter. The sulphate of potash originally present in the alum is left unchanged in the water. The aluminoferric is itself completely precipitated in the process. Its sulphuric acid is carried down by the lime, and its alumina and iron go down with the organic and other impurities. The aluminoferric has been for some time used, with complete success, by two sewage purification companies, also as a mordant in dyeing, and for sizing paper, in conjunction with resin soap. Liquids to be precipitated, if of an acid nature, may be neutralised by the addition of slaked lime. At the waterworks of Alexandria the aluminoferric is employed for the precipitation of Nile water, giving satisfactory results and reducing the cost of cleaning the filter beds. Although the aluminoferric, from the strong affinity of its alumina for colouring matter, seizes upon and carries down the whole of it which may be present in the water, whether in solution or suspension, it is not professed that it will remove all the dissolved colourless organic matter.—Exhibited by PETER SPENCE, Pendleton Alum Works, Manchester.

Ormsby's System of Collecting Pure Drinking Water.—Model shown—The land partially levelled, is laid out in ridge and furrow formation to a depth of about three feet, and covered with slag, concrete, rough slate, etc. Four lines of earthenware pipes per acre, are laid parallel to one another, and fifty feet apart, immediately below the bottom of the furrows, and at right angles to them. Holes are pierced in the pipes where they cross the furrows. All water falling is at once conducted into the pipes and thence to the general reservoir. The collecting surface should lie high, and be some considerable distance from the town to be supplied. Artificial collecting grounds prepared as above described are necessary for the success of the system.—Exhibited by A. ORMSBY, 19, Parliament Street, S.W.

Patent Double-Acting Filter.—Double action 'indispensable' filter—This apparatus, by a movement from the vertical to the horizontal position, passes either filtered or unfiltered water, as may be required. It is compact in form, and is fixed to the ordinary supply tap. The filtering material is granulated charcoal, a felt disc at top and bottom keeping it in place. It may be refilled, the material washed, and used again if desired in a minute or two. To put in fresh charcoal is the better plan. The apparatus may, however, be kept in constant use for a time, varying according to the work required of it, without attention or trouble of any kind.—Exhibited by JAMES FIELDING, 20, Chapel Street, Salford.

'Compressed' Charcoal Filters.—Filters of 'compressed charcoal'—High pressure, cistern, domestic, pocket, glass, table, and ship filters; designs in stoneware, glass, terra cotta, and porcelain. The new filter with cleansing arrangement is rapid and effective. Improved glass filters, registered pattern, are most elegant in appearance and con-

venient in use.—Exhibited by SLACK and BROWNLOW, Canning Works, Manchester.

Moser's Patent Dry Closets.—For use in cases where sewers and water carriage of sewage are not available. Very small quantites of charcoal, discharged automatically, are dusted over the contents of the pail or other receptacle.—Exhibited by Messrs. J. C. ONIONS and Co., Bradford Street, Birmingham.

Muller's Patent Water Meter.—This meter is based on the principle of measuring directly the velocity of the consumed water. It is simple and compact in construction, weight of parts is reduced to a minimum, measures with accuracy under all pressures, is not liable to become deranged, the gearing does not come in contact with the fluid, and the price is low.—Exhibited by Mr. MÜLLER, C.E., 30, Craven Street, Strand, W.C.

Patented Folding Invalid Bed or Clinico Sella, convertible into Parlour, Couch, or Bachelor's Easy Chair, with upper and lower palliasses, and an intervening long and narrow cushion, which can be gently lowered and removed beneath the bed, in order to substitute a bed pan, when the soiled cover of the cushion can be changed as often as desired without any disturbance of the feeblest patient. The apparatus is mounted on silent castors.—Exhibited by Dr. ANCELL BALL, Spalding.

Patented and Portable Disinfecting and Efflux Ventilator, which can be instantly fixed by a thumb-screw to any mantel shelf. It consists of a trumpet-mouthed tube, extending from near to the ceiling to the upper bar of the grate, on which by pneumatic agency the vitiated and infected air is drawn from the ceiling down the tube into a kind of lanthorn, receiving a lighted sulphur candle elevated by a spring (as in a gig lamp), when sulphurous acid is generated, and immediately disinfects the air, and then effluxes it up the smoke flue. For households, emigrant ships, etc.—Exhibited by Dr. ANCELL BALL, Spalding.

Efflux Fixed Ventilator for Public Rooms, Mansions, Ships, Canal Boats, Theatres, etc.—Guaranteed under all disadvantageous circumstances whatever, either from the coldest, dampest, most boisterous, or sultriest of weather, to command an incessant up-current, which can be regulated in a moment to a nicety, according to circumstances, without either an archimedean screw or cowl, a short shaft with cap being substituted for either. —Exhibited by Dr. ANCELL BALL, Spalding.

Combined Portable Influx and Efflux Ventilator, for small halls or passages of our houses, or those in theatres, to which is added a lamp to light as well as warm such halls or passages. By means of the pneumatic agent the cold pure air influxes into an air chamber where it is warmed, then diffused into the halls or passages for respiration. By the same agent the vitiated air from both the hall or passage, as well as from the lighted lamp itself are all effluxed into the outside of such buildings. Dr. Ball also shows a sketch of a peculiar revolving stove, which consumes its own smoke; effluxes the vitiated air from the hall or room, as well as lighting them at night. Also a small lamp with an indestructible wick.—Exhibited by Dr. ANCELL BALL, Spalding.

'Euchlorine Disinfectant.'—The contents of Bottles Nos. 1 and 2 are so prepared that, on being mixed together, effervescence takes place, euchlorine, ozone, and oxygen being evolved, and becoming gradually diffused throughout the apartment in which it is placed. Unlike chlorine, it does not excite cough, head-ache, or nausea, but produces a refreshing sweetness of atmosphere, more like that of sea air. It is a germicide, at the same time that it is a powerful deodorizer and antiseptic, and when used according to the directions accompanying bottles Nos. 1 and 2, after first serving as an aërial disinfectant in the sick room, it may be subsequently used for cleansing house drains, and will be found effectual.—Exhibited by WILLIAM THOMAS WHITE, 332, Kennington Road, S.E.

Disinfectants—'Sanitas'.—The various antiseptic, disinfecting, deodorising, and toilet articles, known under the name of 'Sanitas', contain, as their active ingredients, peroxide of hydrogen, and a number of camphoraceous substances. These are produced by the atmospheric oxidation of essential oils, and are claimed to be identical with those substances, to the natural production of which eucalyptus and pine forests owe their hygenic influences. Sanitas is absolutely non-poisonous, and gives no stain.—Exhibited by SANITAS COMPANY, LIMITED, Bethnal Green, London, E.

Spinal Couch, Portable Grasshopper Couch, Bed Tables, etc., etc.—Hamilton's Grasshopper Couches for invalids, and constructed so that the back and knees can be elevated or depressed to any angle. Prize medal in the Paris Exhibition, 1878.—Exhibited by WM. HAMILTON, Invalid Couch Manufacturer, 45 and 46, Ship Street, Brighton.

Patent Air Diffuser.—Air enters through a number of small tubes. A hole is pierced in the wall for a small box, which fills the hole. The interior portion of ventilator resembles in appearance a box, of pyramidal form, with a number of short and small tubes, having an upward inclination of about 45 degs. Where appearance is an object to be studied, the ventilator can be set on a bracket. In small rooms, the fireplace is sufficient outlet; in large apartments, a special outlet is desirable. The system is also adapted for admitting air through hollow columns, for the ventilation of public buildings, etc.—Exhibited by A. R. & J. W. HARDING, 2, East Parade, Leeds.

Bath-room and Lavatory Fittings.—Sanitary and building appliances of every description; adapted to the requirements of buildings of all classes, and tending to the promotion of cleanliness, health, and comfort.—Exhibited by GEORGE JENNINGS, Stangate, London, S.E.

Stevens' Improved Valve Inlet for Windows. —Made any size, to order.—Exhibited by C. R. STEVENS, Lee Green, London, S.E.

Stevens' Drawer Inlet Ventilator.—For admitting air into rooms, etc., without draught, fitted with an improved arrangement for clearing the air, etc.—Exhibited by C. R. STEVENS, Lee Green, London, S.E.

Stevens' Self-Acting Exhaust Ventilators.—For churches, schools, sewers, soilpipes, etc.—Exhibited by C. R. STEVENS, Lee Green, London, S.E.

Stevens' Cowl, for Curing Smoky Chimneys.—No moving parts, and clear way through shaft for sweep's brush.—Exhibited by C. R. STEVENS, Lee Green, London, S.E.

Cellular System for Erecting Buildings, so as to ensure dryness, together with ventilation, and security from fire. Also, economical warming apparatus, and barometrical and thermometrical instruments.—Exhibited by Mr. G. E. PRITCHETT, Bishop Stortford.

Models of 'Costless Ventilation', as described in the *Builder*, March 1862.—Exhibited by P. HINCKES BIRD, 1, Norfolk Square, W.

Legible Spirit Thermometer.—Exhibited at the Paris Exhibition, 1864.—Exhibited by P. HINCKES BIRD, 1, Norfolk Square, W.

Portable Turkish Bath.—For giving a hot-air or vapour bath, a medicated or mercurial bath. Can be used under a chair, applied to bed, or locally.—Exhibited by JAMES ALLEN AND SON, 64 and 65, Marylebone Lane, Oxford Street, London, W.

Bronchitis Kettles.—For use over fire, or with stand and spirit lamp.—Exhibited by JAMES ALLEN AND SON, 64 and 65, Marylebone Lane, Oxford Street, London, W.

Inhalers, Food Warmers, and other approved form of apparatus; for hospitals, the sick room, and nursery.—Exhibited by JAMES ALLEN AND SON, 64 and 65, Marylebone Lane, Oxford Street, London, W.

Steam Spray Apparatus.—This apparatus was originally exhibited at the Clinical Society, by Mr. R. W. Parker. Messrs. Allen have since made several improvements on the first form of apparatus. As at present manufactured for surgeons, hospital use, and general disinfecting purposes, it is a most useful and efficient appa-

ratus. The boiler holds three pints of water, heated by a lamp filled with methylated spirit, and is tin coated, to prevent the formation of a deposit by the precipitation of matters held in suspension by the water. A glass disc is let in near the bottom of the boiler, to show the water level, and thus prevent danger from a short supply. Another safeguard consists in a novel safety-valve—a piece of lead—of sufficient weight to keep up the necessary pressure of steam without danger of explosion, obviating the disadvantages common to spring safety-valves. The lead weight is cup shaped beneath, to direct the escaping waste steam downwards, away from the faces of the operator and his assistants. The ordinary jets, with short handles, applied to steam apparatus, are often difficult to move, on account of the expansion of the metal by heat. In this apparatus, the steam jet has a long lever handle for raising or lowering the steam jet as required. A metal receiver is attached to the stand on which the spray producer is fixed; a tumbler can be placed in this, for holding the antiseptic or solution to be used. Two pairs of steam and suction jets are supplied with each apparatus; the whole is mounted on a convenient table with castors, and an arrangement for placing the boiler and jet at the most convenient height. There is also a complete circular motion. One supply of water keeps the spray in action for two hours and a half, projecting it to a distance of from six to eight feet. Disinfectants may be reduced to spray by the same means, an advantage where their continuous application is desired.—Exhibited by JAMES ALLEN AND SON, 64 and 65, Marylebone Lane, Oxford Street, London, W.

Ventilating Croup Kettle.—In its general arrangement, material, and, as far as boiler and lamp are concerned, somewhat similar to the above. A small jet allows escape of steam into a horizontal tube, open at both ends, and about three feet long. The jet passing out at one end draws in air, which passes out warm, mixed with steam. The air drawn from the room, and passing through one of the tubes, keeps up a circulation, and assists in ventilating the apartment. If the bed in which the patient lies is enclosed with curtains, the steam delivery tube can pass through a hole made in them at the foot of the bed. Medicated vapour can be obtained by placing the substance in the kettle. The apparatus works five or six hours, without attention.—Exhibited by JAMES ALLEN AND SON, 64 and 65, Marylebone Lane, Oxford Street, London, W.

Wall Papers, free from Arsenic.—Block printed wall papers, of superior quality, in various colours, including bright green, blue, red, brown, white, grey, and many tinted, all guaranteed to be absolutely free from arsenic. The perfect harmlessness of these papers may be safely relied upon, as the use of arsenical colours in this manufactory was discontinued nearly twenty years ago, and all materials now employed are rigorously tested before they are permitted to pass into the hands of the workmen.—Exhibited by WM. WOOLLAMS AND CO., 110, High Street, Manchester Square, W.

Patent Portable Disinfecting Apparatus is a large apparatus for disinfecting bedding, clothes, etc., by heat. Is carried on wheels, and intended for country districts and camp use. The clothes are placed inside, and the folding doors shut, and the heat maintained by a small furnace placed underneath to a temperature of from 250 to 300 degs. Sulphur and other chemicals may be used, but disinfection is perfect without. This is an application, in a portable form, of the apparatus erected by Messrs. Fraser, as appears by their list, in most of the principal hospitals and infirmaries in London and the Provinces. A great element of safety in the use of this apparatus is, that the fumes given off by disinfecting are passed through the fire and rendered harmless.—Exhibited by FRASER BROTHERS, 98, Commercial Road East, London.

Buck's Patent Rain-water Percolator for collecting rain-water. The function of the Percolator is to reject the bad and store the good water. It is self-acting, and prevents the first portion of the rainfall (which washes off and brings down from gutter or roof all kinds of impurities) passing into the storing tank, by directing the water into a waste-pipe or separate tank for a time; afterwards, when a certain quantity has passed through, the Percolator cants and turns the pure water into the storing tank.—Exhibited by RYAN BROS., Ludgate Circus.

Brighton 'Excelsior' Valveless Water-Closet and Urinal.—The closet is shown in action, fitted complete with the Patent Automatic Flushing Cistern in two forms. The first is with the cistern fitted and connected to the closet in the ordinary way, *i.e.*, with the cistern about 5 ft. from the seat. The second is quite a novelty, the closet and cistern being fitted as a piece of furniture. No pipes or wires of any description are seen. Another advantage is that this closet can be made to flush itself say once a day, or at longer intervals, and yet be a perfect water-waste preventer. The urinals have advantages which speak for themselves.—Exhibited by DAN. THOS. BOSTEL, 18 and 19, Duke Street, Brighton; 8, Golden Lane, London.

Patent 'Earth to Earth' Coffin.—A light, perishable coffin, designed to aid innocuous resolution by permitting the soil to come speedily in contact with the corpse, instead of the destructive putrefaction caused by the ordinary solid coffin. The rapid and natural destruction of a corpse is the result obtained by this mode of interment.—Exhibited by the LONDON NECROPOLIS CO., 2, Lancaster Place, Strand, W.C.

Water Waste Preventers.—A large selection, specially adapted to suit the requirements of all the water companies; also high pressure cocks, bath and lavatory fittings, closets of all descriptions, earthenware urinals, and wash basins.—Exhibited by HAYWARD, TYLER, and Co., 84 and 85, Whitecross Street, London.

Norton's Patent 'Abyssinian' Tube Well.—Models of this well known apparatus for obtaining a pure water supply will be shown in the exhibition building, and if the nature of the soil is favourable an actual well will be driven, and shown in operation in the disused railway station adjoining the hall. Messrs. Le Grand and Sutcliff have been already awarded a medal by the Sanitary Institute for their improvements in well making.—Exhibited by LE GRAND and SUTCLIFF, Magdala Works, 100, Bunhill Row, E.C.

Ventilators.—One 3-inch extract ventilator for shaft from soil pipe, one 4-inch extract ventilator for shaft from soil pipe, one 4-inch extract ventilator for apartments, one 6-inch extract ventilator for apartments or buildings, one 9-inch extract ventilator for buildings, one 12-inch extract ventilator for buildings, one railway carriage ventilator, wall drawings.—Exhibited by THOMAS LLOYD, Winchester.

Carbolic Disinfectants and Soaps.—It deserves special notice, that each product has a guaranteed strength, and the independent, unbiassed reports that were published in SANITARY RECORD of July 5, and December 6, 1878, by Drs. Longstaff and Hare, will go far to prove the relative merit of carbolic acid and other much vaunted disinfectants. As a novelty, our Solidified Carbolic Safety Tablets are well worth attention.—Exhibited by F. C. CALVERT AND CO., Bradford, Manchester.

'Excelsior' Mattresses, 'Matlock' Couches, etc., etc.—1. Bedstead, with 'Excelsior' Mattress laid on it; 2. 'Excelsior' Camp and Invalid Bed; 3. 'Excelsior' Hospital Bedstead, 'A' pattern, 6′ 3″ × 2′ 8″; 4. 'Excelsior' Hospital Bedstead, with appliance for raising a patient to a sitting posture; 5. 'Excelsior' Ship's Berth, on wrought-iron frame; 6. 'Matlock' Invalid Couch, in mahogany, with swivel arrangement; 7. 'Matlock' Bed-Rest, in pitch-pine; 8. Patent Sofa-Bedstead, fitted with 'Excelsior' Mesh, forming sofa during day-time, and double bedstead at night; very portable.—Exhibited by CHORLTON AND DUGDALE, 19, Blackfriars Street, Manchester.

LEGAL NOTES AND QUERIES.

ENCLOSURE OF COMMONS.

The 8th section of the Commons Act of 1876 confers certain rights on urban sanitary authorities with respect to the enclosure of commons in the neighbourhood of towns. The commons affected are those that are wholly or partly situate in towns or within six miles of one, the term 'town' being here taken to include any municipal borough, Improvement Act district, or Local Government district that has a population of 5,000 inhabitants at the least. Mr. Mundella wishes these 'suburban commons' to include also all commons that are situate either wholly or partly within ten miles of any town containing at least 25,000 inhabitants, or within fifteen miles of any town containing at least 100,000 inhabitants. The last section of Mr. Mundella's Bill would render it unlawful 'for any person to enclose, except with the consent of Parliament, the whole or any part of a common or reputed common which shall be situate within the distance prescribed by the Commons Act of 1876 in respect of suburban commons'.

PUBLIC HEALTH (INTERMENTS) ACT.

The statute (42 and 43 Vict., c. 31) to amend the Public Health Act, 1875, as to interments, which received the Royal assent on the 21st inst., contains three sections, the first of which declares that it is to be construed as one with the Public Health Act, 1875, and the second section contains three provisoes, and the third section states that the Cemeteries Clauses Act, 1847, is to be incorporated with the present Act. The provisoes in the second section are in the following words:—'1. The provisions of the principal Act as to a place for the reception of the dead before interment, in the principal Act called a mortuary, shall extend to a place for the interment of the dead in this Act called a cemetery, and the purposes of the principal Act shall include the acquisition, construction, and maintenance of a cemetery. 2. A local authority may acquire, construct, and maintain a cemetery either wholly or partly within or without their district, subject, as to works without their district for the purpose of a cemetery, to the provisions of the principal Act (Public Health Act, 1875), as to sewage works by a local authority without their district. 3. A local authority may accept a donation of land for the purpose of a cemetery, and a donation of money or other property for enabling them to acquire, construct, or maintain a cemetery.'

THE NEW SALE OF FOOD AND DRUGS ACT.

The object of the statute to amend the Sale of Food and Drugs Act, 1875, is to explain the meaning and effect of section 6 in the recited Act, on which conflicting decisions have been given in England and Scotland. It is now enacted that in any prosecution for the sale of adulterated articles it is to be no defence to allege that the purchaser having bought only for analysis was not prejudiced by such sale. Neither is it to be a good defence to prove that the article, though defective in nature, or in substance, or quality, was not defective in all three respects. An officer, inspector, or constable may obtain a sample of milk at the place of delivery, to submit the same to an analyst. 'The seller or consignor, or any person or persons intrusted by him for the time being with the charge of such milk, if he shall refuse to allow such officer, inspector, or constable to take the quantity which such officer, inspector, or constable shall require for the purpose of analysis, shall be liable to a penalty not exceeding £10.' Any street or open place is to come within the meaning of the 17th section of the principal Act. In determining where an offence has been committed under the 6th section of the Act, 1875, a reduction is to be allowed to the extent of 25 degrees under proof for brandy, whisky, or rum, and 35 degrees for gin. Every liberty having a separate Court of Quarter Sessions, except a liberty of a Cinque Port, is to be deemed to be a county, and Quarter Sessions of boroughs are not to contribute towards the expense of a county analyst. There is a provision as to boroughs with separate police. The last section in the new Act contains a special provision as to prosecutions under the principal Act, and, notwithstanding section 20 of the principal Act, it is now enacted that the summons to appear before the magistrate is to be served upon the person charged within a reasonable time, and, in case of a perishable article, not exceeding 28 days from the purchase. The particulars of the offence and the name of the prosecutors are to be stated in the summons, and the same is not to be made returnable in less than seven days from the service on the person summoned.

WATER SUPPLY.

A dispute on this subject has arisen between the Sittingbourne Local Board and the Milton Improvement Commissioners. The former authority had an application from a resident of Milton to lay water on to his house from the Sittingbourne main, which runs in front of his house, and gave the commissioners a verbal intimation thereof through their surveyor. The Commissioners replied that they would give the Sittingbourne Local Board permission to break open the road, and make the connection from their water main, on the understanding that when Milton had a public water supply of its own the Sittingbourne main should be disconnected. This was followed by a communication from the surveyor to the Sittingbourne Board to the effect that he could not fall in with such an arrangement, and giving the Commissioners three days' notice of his intention to make the connection. The commissioners replied by threatening him with an injunction if he did so. The Sittingbourne Local Board rejoin that they do not dispute the authority of the commissioners to supply their own district with water, but until the commissioners are in a position to do so they feel, having regard to Section 44 of the 10th Vict., c. 17, they would be taking a grave responsibility as a sanitary authority in refusing a water supply to such of the inhabitants as reside in the road in which the mains are laid. The Milton Union Rural Sanitary Authority at Sittingbourne have had under consideration the circular letter issued by the Local Government Board with reference to the Public Health (Interments) Act, 1879, and instructed their sanitary officers to make an inspection of the burial grounds in the various parishes in their districts, with a view of ascertaining their sanitary condition. This board, therefore, has the distinction of being the first recorded as taking action under the new burial statute, and they were also one of the first, if not the first, to put into operation the provisions of the Public

Health (Water) Act, 1878, which has been practically ignored by many rural sanitary authorities.

NEGLECTED LUNATICS.

A Bill has been issued, introduced by Lord O'Hagan into the House of Lords, for extending to Ireland certain of the provisions of the English Lunatic Asylums Act of 1853 that have reference to the visitation and confinement of pauper lunatics. Among the other provisions of Lord O'Hagan's Bill is one which gives jurisdiction to the Judge of a Civil Bills Court over the persons and property of lunatics whose property is so small as to be entitled to exemption from fees and percentage under the Irish Lunacy Regulation Act of 1871. Another provision authorises the Guardians to relieve a poor person, either in the workhouse or out of it, where his destitution is caused by his being temporarily disabled by reason of mental defect or the mental infirmity of any one dependent on him for support. Moreover, the Bill empowers the governors of Irish district lunatic asylums to board out a lunatic with any private person upon the latter's undertaking that the lunatic shall be properly taken care of, and shall be prevented from doing injury to himself or to others. Every lunatic so boarded out is to be subject to the periodical inspection of the medical officer of the dispensary district.

THE NEW CEMETERIES ACT.

A circular has been issued from the Local Government Board, containing instructions to urban and rural sanitary authorities with respect to the carrying out of the Public Health (Interments) Act, 1879, which came into operation on the 21st of July. After stating that the object of the Act is to enable sanitary authorities, rural as well as urban, to provide cemeteries for their districts, and that for this purpose all the provisions of the Public Health Act, 1875, with respect to a mortuary are extended to a cemetery, the circular proceeds to say that although the Legislature has not specified the cases in which it is incumbent upon the sanitary authority to give effect to the provisions of the new statute, yet, seeing it is incorporated with the Public Health Act, there can be no doubt that wherever, in the interests of the public health, it is necessary that a cemetery should be provided in any locality, the Legislature contemplated that the local authority would exercise the powers now conferred upon them. The following are considered circumstances under which it will be incumbent upon the sanitary authority to take action :—1. Where in any burial-ground which remains in use there is not proper space for burial, and no other suitable burial-ground has been provided; 2. Where the continuance in use of any burial-ground (notwithstanding there may be such space) is by reason of its situation in relation to the water supply of the locality, or by reason of any circumstances whatsoever, injurious to the public health; 3. Where, for the protection of the public health, it is expedient to discontinue burials in a particular town, village, or place, or within certain limits. Other circumstances are, inconvenience of access, nature of subsoil, and it may occasionally be expedient to provide, in accordance with the policy of the Burial Acts, a cemetery in which persons of different creeds may be buried with their own religious rites. The question whether a cemetery should be provided for a particular locality will be one for the determination of the sanitary authority in the first instance, and then the authority of the Local Government Board may be invoked. The President has reason to believe that in numerous localities considerations of public health require that a cemetery should be provided, and with a view of enabling the authority to determine whether on sanitary grounds it is necessary or desirable that a cemetery should be provided for all or any part of their district, the medical officers of health should be instructed to report upon the state of the several burial-grounds within the area subject to their jurisdiction. The statute enables a sanitary authority to acquire, construct, and maintain a cemetery either within or without their district. In the latter case, however, at least three months before the cemetery is commenced public notice must be given, and, in the event of any objection, the work cannot proceed without the sanction of the Local Government Board, after local inquiry. Where money is not borrowed with the sanction of the central authority for the object intended, the sanitary authority may charge the cost upon the local rates. In the case of an urban sanitary authority the rate liable for this cost will be the general district rate, or other rate applicable to the general purposes of the Public Health Act within the district. In the case of a rural sanitary authority the amount will be defrayed out of the rate applicable to the payment of general expenses. The cemetery is not to be constructed nearer to any dwelling-house than 200 yards, except with the consent of the owner and occupier. The sanitary authority may set apart a portion of the cemetery for burials according to the rites of the Established Church. A chapel, to be approved by the Bishop, must be built on the consecrated part for the performance of the Burial Service of the Established Church. The sanitary authority may set apart the whole or a portion of the unconsecrated part of the cemetery as a place of burial for persons not being members of the Established Church, and may allow in any chapel built in such unconsecrated part a burial service to be performed according to the rites of any church or congregation other than the Established Church. The Act does not extend to the metropolis.

NEW POOR-LAW ACT, AND INFECTIOUS DISEASES.

Under the New Act to amend the Poor-Laws, which came into operation on the 1st inst., power is given to the Metropolitan Asylums Board to contract with any local authority in the Metropolis for the reception and maintenance in any hospital belonging to the Board of any person suffering from any dangerous infectious disorder. Further, the Metropolitan Asylums Board may provide ambulances for the conveyance of persons suffering from dangerous infectious diseases. There is a provision in the same Act that any building or hospital vested in guardians may be vested in them as the rural sanitary authority of such union, and used as 'infection hospitals'.

HABITUAL DRUNKARDS.

On Jan. 1 next, the Habitual Drunkards Act, to facilitate the control and cure of habitual drunkards, will come into operation, and be in force until the expiration of ten years from the date of its passing, July 3, 1879. In the preliminary part of the Act it is laid down that an 'habitual drunkard' means 'a

person who, not being amenable to any jurisdiction in lunacy, is, notwithstanding, by reason of habitual intemperate drinking of intoxicating liquors, at times dangerous to himself or herself or to others, or incapable of managing himself or herself, or his or her affairs.' A 'retreat' is stated in the Act to mean 'a house licensed by the licensing authorities named by this Act for the reception, control, care, and curative treatment of habitual drunkards'. No licence shall be given to any person who is licensed to keep a house for the reception of lunatics. The Act gives to the justices of the peace in England and Ireland, and to the sheriff or his substitute in Scotland, power to hear and determine, under the Summary Jurisdiction Acts, an information or complaint under the Act. The justices are to have the power to send habitual drunkards to retreats; and persons may be admitted to retreats on their own application, and such applicants, after their admission and reception into retreats, unless discharged, shall not be entitled to leave the retreat till the expiration of the term mentioned in the application, provided that such term shall not exceed twelve months. Provisions are made for the inspection of retreats by an officer, to be styled 'the inspector of retreats', and each retreat shall be inspected at least twice in each year. Power is given to the justices to permit an habitual drunkard confined in a retreat to live with any trustworthy and respectable person willing to take charge of him for a definite time for the benefit of his health. An habitual drunkard escaping from the person in whose charge he has been placed shall forfeit his licence, and may be taken back to the retreat. Ample provision is made by the Act for the medical attendance and care of those detained in the retreats under orders made by the justices.

POWERS OF ENTRY FOR PURPOSES OF DISINFECTION.

Please favour me with an opinion on the following point. The second paragraph of Section 120 of the Public Health Act, 1875, enacts that if a person to whom a notice to disinfect his house has been given by the local authority fails to comply therewith, he shall be liable to a penalty, 'and the local authority shall *cause* such house, or part thereof, and articles to be disinfected'. I wish to know what powers of entry the local authority or their officers have in case the occupier refuses to disinfect, or to permit the local authority to do so, after the expiration of the notice. If it is necessary for a magistrate's order to be obtained, much delay must inevitably ensue.

QUÆRENS.

[We are afraid that the officers of a sanitary authority have no power of entry for the purpose of carrying Section 120 into effect, nor can a magistrate's order be obtained under Section 305 of the Act for authorising such an entry. Perhaps the best thing, under the circumstances, would be for the authority to avail themselves of the provision in Section 306 of the Act, that whoever 'wilfully obstructs any member of the local authority, or any person duly employed in the execution of this Act', shall be liable to a penalty of five pounds. The threat of this penalty would probably bring the offenders to reason.—ED.]

REVIEW.

An Introduction to Commercial Organic Analysis. By A. H. ALLEN, F.C.S. London: Churchills, 1879.

THE last few years have been uncommonly prolific in new books on chemistry. Scarcely a month has passed without the appearance of some new manual or hand-book, intended either as a guide for students or for the use of commercial analysts or food analysts, and it could hardly be expected that a number of books of this kind should bear any very great stamp of originality, for in almost every case the bulk of the work has been devoted to inorganic chemistry, and the labour of the authors has been directed mainly to presenting the various branches of this subject in a more convenient and available form for reference.

The author of this work has, however, struck out an entirely new path. Starting in the preface with a reference to the large number of books of the class above referred to already in existence, he justly points out that the practical and commercial analysis of organic products is not only in a far more backward state than is justified by the difficulties of the subject, but that there was a great need of some comprehensive collection of the information available on the subject, so as to supply analysts and students in one volume with information which ordinarily would have to be searched for through a large number.

The author very wisely omits the stereotyped descriptions of some processes, modes of manipulation, and precautions, which are the every-day work of analysts, and gives his attention almost exclusively to the special processes employed in assaying commercial organic samples for purity or strength. By adopting this course, he has succeeded in bringing a vast amount of information within the compass of a single volume, with only such a judicious reference to the precautions necessary in carrying out each process as is really desirable for the use of a competent analyst. The present volume was intended to cover the whole of the ground, but the author points out that the subject has grown so rapidly in his hands, and the time occupied in the verification of a considerable number of the processes described was so great, that to prevent the information from becoming stale and so losing much of its value, the first portion is now published, leaving the sections on oils and fats, and various other substances, to form a second volume at a future time.

Ultimate organic analysis is almost excluded from the book, for, as the author justly says, while English chemists are carefully taught to execute ultimate organic analysis, the course of instruction in many of the leading laboratories does not even include qualitative tests for such substances as alcohol, chloroform, carbolic acid, glycerine, and quinine.

The larger portion of the work is, of course, derived from other sources, which are somewhat fully set out in the preface; but we think that in some cases reference to the pages in other books from which the information is obtained, would have increased the value as a book of reference—not that such references are by any means entirely omitted, but it is too frequently the case that the book only is mentioned without a reference to its page.

The chapter on Alcohols is an especially good one, and it will probably be difficult to find seventy pages in any other chemical work where so much information, and that of such an exhaustive character, is

given as to the commercial examination and analysis of methyl, ethyl, and amyl alcohols, and glycerine.

Commercial alcoholic liquors, such as wine, ale, and spirits, are fairly and fully treated, and the instructions for the calculation of the percentages of proof spirit are so clear that if followed we should hear the last of such singular misstatements as occur in some of the official reports recently presented to the Select Committee of the House of Commons on the Sale of Food and Drugs Amendment Bill.

Dupré's researches on Alcohols are laid under rather heavy contribution and acknowledged, and it is satisfactory to find that the author has the courage of his opinions, and in some cases expresses his dissent from the figures or conclusions quoted. As an instance of the care with which this chapter has been compiled, we may mention that nearly a page is devoted to the analysis of Kirschwasser, with a special reference to the fact that copper is almost always present in it, and that hydrocyanic acid is occasionally added in the form of peach-blossoms or cherry laurel leaves. We do not call to mind any other English chemical work in which this spirit is referred to in more than the most trivial manner. Even the almost exploded Robur and Absinthe come in for a share of notice.

The chapter on the acids derivative of the alcohols and vegetable acids contains a large amount of useful matter. The analysis of tartaric acid and citric acid is referred to with much greater fulness and accuracy than is commonly found, and in this case it is attended with special advantage, because the literature on this substance is scattered through so many works that hitherto it has been a matter of some trouble to refer to it.

Tanning materials and inks also come in for a brief but satisfactory notice.

The book is got up in an extremely handy style for reading, and by the use of displayed type reference from one paragraph to another, or to any particular thing which may be required, is rendered very easy. The index, so far as we have been able to verify it, is carefully prepared, and quite as full as could fairly be expected in such a book. We think the volume will have an extensive sale, and are certain that there are few analysts or medical officers of health who will not find in it much information of a valuable kind.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

SWIMMING FOR WOMEN.

The Women's Union Swimming Club held their first contest on Wednesday, September 24th, at the St. Pancras Baths, Tottenham Court Road. The first prize, a silver locket, was won by Miss Jessie Warren, for swimming two and a quarter lengths. The second prize, a silver brooch, was gained by Miss Agnes Robb, swimming two lengths. The third prize, a handsome purse, was carried off by Miss Sarah Gange, for swimming one and a quarter lengths. Eleven other ladies won each a silver pencil-case, by swimming across the bath. None of these ladies knew anything of swimming before the club commenced teaching it in May last. The success of this attempt shows more clearly than could be done by any amount of argument the necessity for more swimming-baths in London for women, especially for working women. The attendance has been, after work hours, far greater than could be conveniently accommodated; and it is to be hoped that our success in St. Pancras will induce other parishes to follow the good example, and open their baths to women at least once a week.

ELLEN GROUT, Hon. Sec.
Women's Union Swimming Club,
86, Herbert Street, N.

MOTTO FOR A PUBLIC-HOUSE.

Many years ago, a prize was offered for the best sign for a public-house, about to be erected. I never heard the result, but it has just occurred to me that the following Shakesperian lines would not be inappropriate, though I doubt if it would have obtained the prize:—

'An if a man did need a poison now,
Here lives a caitif wretch would sell it him.'

P. H. B.

ANSWERS TO CORRESPONDENTS.

R.W.D.—Several kinds of earth-closet and commode are in the market. There is also a variety of earth-closet in which finely sifted ashes are used. You can see specimens of both kinds at the Parkes Museum of Hygiene. Moule's system (earth only), 5A, Garrick Street, Covent Garden, W.C., and Mr. J. Parker's, Woodstock, Oxon., are largely used. The Sanitary Economic Manure Company, Factory Lane, Salford, have a good assortment of dry closets for ashes only. The British Sanitary Company, 43, West Regent Street, Glasgow, are also vendors of apparatus of a similar kind. The cost of fitting is very small; in some cases no outlay is necessary.

SANITARY JOTTINGS.

At the last meeting of the Town Council of Wakefield, Dr. Wade, medical officer for the borough, presented his half-yearly report, which stated that 366 deaths had been registered, or 42 more than in the first half of last year, showing an average of 22.52 per 1,000. The mean average for England during the half year was 23.15 More than one-eighth of the total number of deaths were at above the age of 70 years, showing that Wakefield, from its natural advantages, was favourable to longevity.——The medical officer of Luton recently reported to the Town Council a death-rate for the past quarter of 22 per 1,000. The births were 226, and the deaths 131; 16 died from phthisis, which he attributes in a large measure to the occupation and habits of many engaged in the staple trade. But on the whole he congratulates the authorities on the very fairly healthy and sanitary state of the borough. In the month of August last the death-rate had only been about 11 per 1,000.—— The quarterly report of the medical officer of health for Sandown (Dr. Neal), read at the last meeting of the Local Board, showed the town to be in an exceptionally healthy condition. The number of births registered in the quarter is 26, with only 8 deaths, one of these being a non-resident, making the death-rate 9.3 per 1,000, as compared with 21.1, the average rate of mortality in the United Kingdom during the same period.——The sanitary authorities of Tamworth, after boring to a depth of only 170 feet, have struck upon a spring of water, the yield of which is reckoned at more than 1,000,000 gallons a day, being more than double the quantity required for the supply of the town and district.——The *Boston Medical and*

Surgical Journal of August 28 reports that in a house at Ogdensburg, New York, where five children were ill with diphtheria, three kittens which were permitted to be with them from time to time were taken with the disease, and all died on the day after the attack commenced. A *post mortem* examination showed the presence of diphtheritic membrane in abundance in their throats.——Complaints continue to be made respecting the quality of the water supply of Gateshead. The borough analyst has reported that from samples recently taken it was unfit for domestic purposes, being impregnated with vegetable matter to a serious extent, which was likely to be productive of diarrhœa. The whole of this extensive district is supplied by the Newcastle and Gateshead Water Company.——The health of Newcastle-on-Tyne, for the quarter ending June 30, has been very unsatisfactory; the death-rate during this period averaged 25.4 per 1,000, which, compared with previous quarters, is exceedingly high. The prevalence of scarlet-fever, from which no less than 57 fatal cases occurred during the quarter, accounts in a great measure for this high rate of mortality, and indicates the existence of an insanitary state of matters, which is acting prejudicially to the public health. No doubt, the late dearth of employment in the North, and the consequent want of sufficient and proper food, for a great part of its crowded population, are the main causes of much of the prevailing sickness.——Several cases of scarlatina having appeared in the village of Ludlington, near Frome, the school managers have thought it prudent to close the schools, and the sanitary authorities have taken steps to prevent the spread of the disease.——Attention has been drawn to the insanitary state of London Colney, in the St. Albans rural sanitary district. It appears that an outbreak of diphtheria has occurred in the village, which in one case was fatal. Dr. Saunders, the Medical Officer of Health, reports that the sewerage is defective and unventilated, that there is no proper system of excrement disposal, and that the water-supply is insufficient. Recommendations have been made by him for putting the place into a more wholesome state.——The death-rate of Walsall for the quarter ended the 30th June last was 20 per 1,000, as against 19.8 in the corresponding quarter of last year. Of the total number of 291 deaths, 73 were in children under one year of age, and 32 were from scarlet fever.——Thomas White, butcher, of Willoughby, has been sent to prison for three months, without the option of a fine, for having the carcase of a calf unfit for human food in his possession at Clifton. Defendant is an old offender, against whom there is at present a case of appeal pending at the Court of Common Pleas for a similar offence.——At a recent meeting of the Coseley Sanitary Authority, it was reported that in one part of the district the publicans brewed ale with sewage water obtained from a brook, and that, owing to the water containing peculiar matter, less malt was required to make ale strong. The surveyor was authorised to serve notices for pure water to be supplied.——The death-rate of Redditch for August last was at the low figure of 11.1 per 1,000, as against 13.6 for the preceding month, and 36.1 for August 1878. An epidemic of measles which commenced in July of this year still continues. The drainage question is still *in statu quo*.

Dr. Barry, of Settle, amongst other items of hard work, has lately drawn up a code of regulations as to private drainage for some of the places in his district. The regulations are based upon those of Mr. Rogers Field, and seem to us to deal with all the necessary points.

The death-rate of Birmingham for the second quarter of this year was 22.04, against 21.35 in the corresponding period of 1878. This increase was not due to zymotics, but to local diseases generally, more particularly bronchitis and to atrophy and debility.

The Urban Sanitary Authority of Redditch have now had a local census of their district taken, as repeatedly advised by their medical officer of health (see vol. x, p. 244). The result has been that the actual population of the place has been ascertained to be 9,686, or more than a thousand over the medical officer's calculations.

An important report on some proposed improvements in the manner of treating the town refuse has been presented to the Town Council of Warrington by Mr. Longdin, the borough surveyor. By Mr. Longdin's scheme, which we are glad to find has been adopted by the Council, the nuisance arising from the existing depôt will be suppressed, no accumulations of offensive matter will be allowed to occur, street sweepings, and other refuse materials, will be utilised to the fullest extent, instead of being carted to tips; and greater economy of labour will be ensured.

The Goole Local Board have instructed Mr. E. C. Buchanan Tudor, their engineer and surveyor, to prepare plans of a complete system of sewerage for New Goole and district. The Old Goole sewerage contract has been let to Mr. C. Marsh, of Thorne, who will proceed with the works at once. Mr. Tudor strongly advised the Board to carry out the main tank sewer 300 yards further, as the sewage would be tide-locked for many hours, and so that the storm water may be more readily dealt with; but the Board themselves considered an 18-inch pipe sufficient, and ordered it to be laid down. The general opinion of other engineers is that the 18-inch pipe will be a failure, at a considerable cost to the ratepayers.

At the recent annual meeting of the Newcastle Improved Industrial Dwellings Company, Mr. Councillor Dixon drew attention to the paragraph in the report of their able and indefatigable agent, Mr. John Price, which stated that the average death-rate of the dwellings had never exceeded the rate of 12.8 in the 1,000, in contrast to that of other parts of the town inhabited by the working classes, which, according to the able report of their medical officer of health exhibited, in some cases, an average death-rate of 40 in the 1,000 during the past year. Reflective persons would at once grasp the pregnant facts presented by the above figures. The chairman also alluded to the matter in pertinent terms, and said that as health was really a working man's capital, no prudent man would sacrifice it by living in an unhealthy house, especially when he had the opportunity of securing one which experience had shown might lengthen his days and increase his comforts. It may be noted that this company has also been successful financially, having paid 5 per cent. for nine years in succession, showing in these dull times that healthy houses pay better, a significant fact for investors.

A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

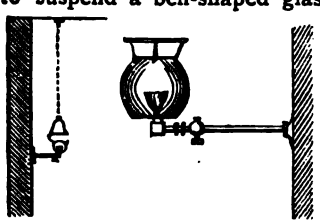
(*Continued from p.* 121.)

AIR.—XXVII.

OUTLETS FOR THE PRODUCTS OF GAS COMBUSTION.—We are informed by the medical profession that many disorders of the human frame are due to the inhalation of air which has been rendered impure by the burning of gas in rooms insufficiently ventilated. When coal gas escapes unburnt into a room, and when the proportion of the gas to the air is less even than that at which the mixture becomes explosive—one part of gas to eleven of air—a prolonged stay in such a room would cause death by asphyxia. The evils engendered by the substitution of air fouled by the combustion of gas for pure air in a room or workshop are cumulatively, however, far more fatal to humanity, and it is doubtful whether there be any household, in which coal gas is consumed, that has utterly escaped harm. The bad effects are slow of manifestation, but certain to make themselves eventually felt. And many forms of disorder have been added to the list since the year 1805, when it may be said that coal gas was fairly introduced as a lighting medium.

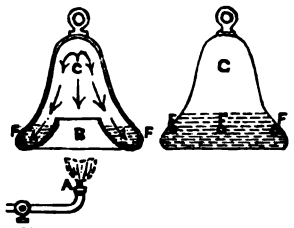
The carbonic acid which is produced when gas is burnt is not so poisonous, and even 10 per cent. of it in a room will not render it absolutely irrespirable; and if the whole of the gas were consumed and no carbon escaped half-burnt to form carbonic oxide—one part of which in 1,000 of air renders the latter poisonous—it would, perhaps, not be necessary to take so many precautions for the proper removal of the products of gas combustion. It is the supplementary products which prove injurious, such as carbonic oxide and aceteline—another highly poisonous resultant—and there can be no doubt that wherever coal gas is burnt, proper means should be provided for the removal of the vitiated atmosphere. It would be well if the recommendations of physicians on this head were everywhere observed. As a general rule, about six cubic feet of air is consumed by every cubic foot of gas, and this is returned to us in a room by about half a cubic foot of carbonic acid.

When the gas escapes partially burnt only and the light close to the ceiling, it becomes customary to suspend a bell-shaped glass a little above the light with a view of arresting these particles. This intervening globe has the effect of staying the excess carbon until it becomes burnt up, and is thus so far useful. The same effect is produced, with a more complete combustion, when the globe is surmounted by a sheet of mica, and this practice is now very commonly resorted to. Caps or coronals of terra cotta are also sold for the same purpose.



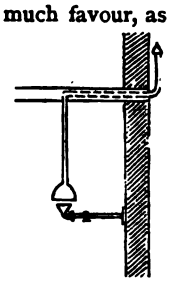
A, gas light in globe, with bell-shaped glass overhead; B, gas globe, with sheet of mica above.

These are only half measures, however, and while they may succeed in a destroyal, by combustion, of the half burnt particles of gas, they make no provision for the removal of the carbonic acid and other deleterious products. It became necessary, therefore, as their evil effects became evident, to provide for the removal of these, and some curious contrivances were introduced for this purpose. For instance, in 1855 Mr. E. Simons, of Birmingham—when gas was first employed by Mr. Murdock in a factory—devised the following method of condensing and absorbing the smoke and products of combustion:—He constructed a bell-shaped vessel of glass, which he suspended mouth downwards over the flame, and the lower edge of this vessel was turned inwards and upwards so as to constitute an annular vessel at the bottom of the bell, in which was poured a solution of potash or soda or of their carbonates. When this was placed over the gas flame, the current of heated air and products of combustion entered the bell-mouth and descended into the annular vessel, where the carbonic acid gas became more or less absorbed. The smoke was also partly condensed on the inner surface of the bell and in the liquid, the evaporation of the water tending to cool the bell and favour the condensation of the smoke. The escape of the final heated currents, after purification, was at a series of holes made in the outer rim, above the liquid matter which had been introduced as an absorbent of the carbonic acid gas.

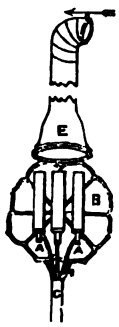


Simon's Bell-mouthed Condenser. C, bell-mouthed vessel; A, gas light; B, chimney entrance into bell; F, exits.

Inventions such as these did not, however, find much favour, as they were but mere steps towards the solution of the problem, and recourse was eventually had to the removal of the vitiated air, by zinc or other tubes, to the outer air, or into heated upcast shafts. This is now considered to be the most perfect means of riddance of the products of combustion, and it is interesting to trace the history of the many methods devised for perfecting the idea.


Gas light, fitted with product conveying tube to outer air.

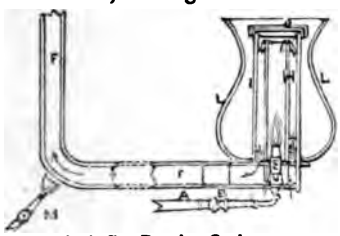
Among the first to provide for a special removal of the air fouled and heated by gas burning, was Mr. J. J. Mechi, of London, in 1840. He placed the burners as near to the ceiling line as possible, and, by the combination of reflecting surfaces, threw the light down where it was most required. Coming to the conclusion also that the greatest light cannot be obtained from gas unless there be a large supply of fresh air, and, above all, a rapid removal of the heated products, he constructed a chimney to each of his circular burners, which offered a sectional area of eighteen superficial inches for each burner capable of consuming from ten to thirteen cubic feet of gas per hour, and furthermore employed an iron shaft, rising from the top of his gasalier and terminating in the open air, or into a chimney or other outlet from the room. He was of opinion that a shaft of at least thirty feet was necessary in order to acquire a sufficient draught necessary to remove the heated



Mechi's Gas Burner Ventilating Outlet. A, A, A, ring burners with chimneys; B, reflector; E, withdrawing shaft with cowl.

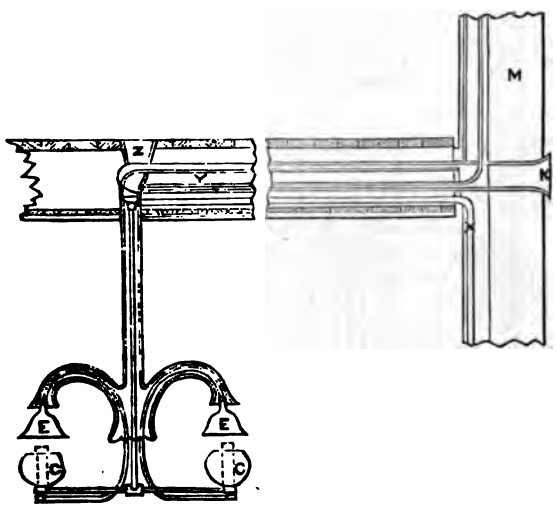
air, and, at the same time, induce a proper supply of air towards the burners.

In 1843, a London gasfitter named Faraday introduced another method of removing the products of combustion, and preventing that high degree of temperature which is experienced in rooms where much gas is consumed. The products of combustion in this case, coming from the interior of the glass chimney, were prevented from entering the atmosphere of the room by a mica cover, which was placed upon the top of a second or encompassing glass tube, and they consequently passed, by means of a downward draught, into a tube which led into the outer air or into some other flue. In order to obtain the necessary draught in this removal-flue, he heated first of all the latter by means of a pilot burner, and, in some cases, he used a fan for this purpose; and finding that, in small rooms, the sudden shutting of a door created a partial vacuity and tended to cause a return of the air through the withdrawal-tube, he applied a light valve to the shaft at some convenient spot.

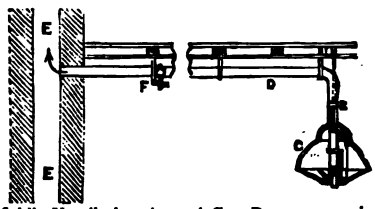


R. Faraday's Gas Burning Outlet. A, gas supply; B, stop cock; E, argand burner; F, tube for removal of products; H and I, glasses with space between; L, glass shade; J, mica cap; M, pilot light for inducing current.

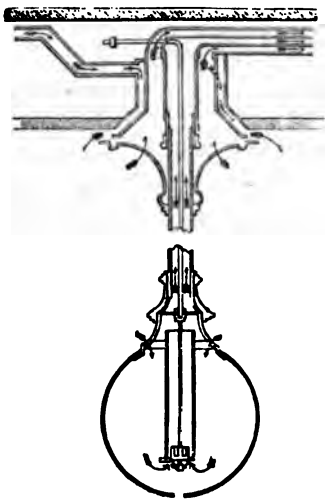
In order to render gas lights as far as possible self-preventive of impure exhalations, and cause them to consume their own smoke as well as assist in ventilating the apartment in which they performed service, Mr. J. Braithwaite, C.E., of London, devised in 1847 a system, by means of which the smoke and other loaded products were conducted back to the burners to be consumed in their flame. In some instances—as in the case of the illustration—the gas lamp was suspended from the ceiling by means of a tubular pillar, from the bottom of which two tubular arms branched off at right angles, and terminated in the burner. From the bell-mouthed receiver suspended over the globes of these burners, two smoke-pipes were carried, and were led eventually to the under-side of the flame, by which means the smoke was consumed. The radiated heat and vitiated air consequent upon the burning of the gas was removed by a specially provided tube leading into a flue in the ordinary way. Mr. Braithwaite sometimes also caused the tube which removed the heated products to be led inside another tube, which latter communicated with the outer air, and by this means heat was imparted to the inflowing air, and the room above supplied with warm air at the floor line.



Braithwaite's Smoke-consuming Gas Burners. C, globe; Z, bell-mouthed collector; V, removal tube; K, inlet of air to be warmed for a room above, with floor-level delivery at Z.

It soon began to be comprehended by every one that the most effective method of getting rid of the products of combustion was by means of a flue, and it is curious to notice how many persons seem to have invented, independently of each other, a means of doing so. For instance, in 1864 a barrister named Wakefield introduced a plan which must most assuredly have been in very general use many years before. It was simply the union of a peculiar shaped glass globe and short upper pipe of earthenware or other material, and the attachment of the latter to a tube leading into a chimney-flue. There was also a means of closing the draught in the withdrawing flue by a stop valve.

Wakefield's Ventilating Argand Gas Burner. B, pipe over chimney, with glass shade C fitted to same; D, horizontal pipe-flue to chimney E, with valve at F.

Previous to the introduction of Mr. Wakefield's invention, several self-ventilating gas lights had been introduced, some of which are in very general adoption at the present time. For example, the ventilating globe-light may be mentioned, first invented by Ricketts, but now manufactured by several London firms.

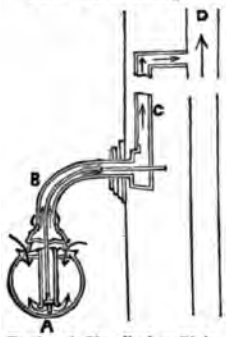


Ventilating Globe-light Pendant.

The supply of air to this kind of burner is brought, for the most part, from the external atmosphere, the inlet being a grating in the external wall, the conveying medium an iron pipe leading to the space between

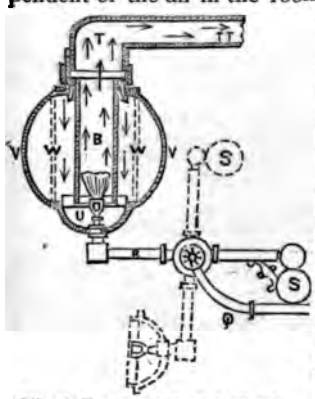
the inner and outer cones, and the discharge inwards being close to the ceiling line. The intake of this air to the flame is by way of an opening at the top of the globe. The pendant itself contains the gas supply-pipe, and acts as a pipe to carry off the products of combustion, the pipe being taken, by way of the space between the joists, into the chimney-flue or into a shaft specially provided. In the lights of this kind manufactured by Messrs. Benham and Sons, of London, many excellent improvements have been introduced which prove of the very highest value in regulating the supply of air, etc.

The Ventilating Globe Bracket of Messrs. Benham and Sons is a contrivance of a similar character, for use against walls. In this case there is no separate air supply to the burner, and the air for the support of combustion is taken from the room; but there is the usual hot air pipe for the removal of the heated products. This outlet pipe to the chimney-flue is fitted with a valve, which is closed when the burner is not alight, so as to prevent the return of smoke. It is not absolutely necessary, of course, to lead the foul air pipe into a flue, and it will suffice to carry it through the wall into the external air, care being taken to terminate the outlet some few feet above the bracket level, and to properly fit the top of the tube with a down draught preventor.



Benham's Ventilating Globe Bracket. A, globe; B, foul air pipe, with gas supply pipe inside; C, continuation of same in wall and to flue D.

A novelty in gasfitting was introduced by Messrs. Virgo and Akeroyd in 1877, which had for its basis the supply of air to the burners, in some cases independent of the air in the rooms, the employment of special tubes for the removal of the burnt air, and the taking in of air to the burner at top of the globe. It will suffice to describe say, for instance, a bracket supply. This was hung with swivel and balance-weight, to allow of disconnecting the gas burner from the shade and burnt air pipe. The end of the gas pipe was fitted with a gallery, upon which rested the globe and the shade, and between the shade and the chimney-glass the air was brought in for the support of combustion—entering at the top of the globe and descending to the burner. The products of combustion were removed by way of the chimney-glass interior, the top of which was pushed up to the end of the burnt air tube, which had its termination in the open air or in some flue.



Virgo's Ventilated Gaslight Bracket. Q, bracket, with swivel supply gas pipe R, and balance-weight S; U, gallery; V, globe, with shade inside at W; B, glass chimney; T, T T, burnt air withdrawing tube.

Mr. Buchan elaborated during the last year a complete system of withdrawing the heated products of combustion generated by gas burners. When a room is fitted up with a fixed hanging single globe, the globe is hung by its gallery, and from the top of the globe a ventilating pipe is led upwards into the outer air, the upcast being kept constant by means of a fixed foul air withdrawing cowl.

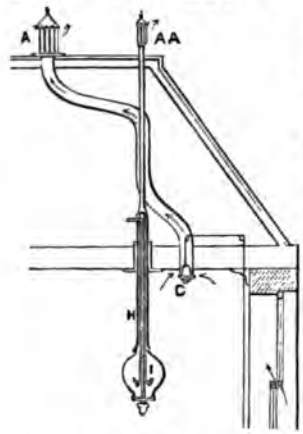


Fig. 1.

Buchan's Hanging Single Globe Gas Ventilator. I, globe; H, ventilating tube and upcast, with exhaust cowl at A A.

C, ceiling ventilator outlet into shaft leading to fixed cowl at A.

The same method of removing the foul air is carried out when the gasaliers are of the rising and lowering order. A ventilating tube is carried up from each light and globe, and made to rise and lower, freely, within the lower ends of branch pipes which are brought down vertically from the uptake-shaft in the roof space above. To prevent overheating or firing the woodwork of the floors, an isolation tube is fitted around the branch pipes which remove the heated air and gas fumes. In some cases the foul air is discharged into the outer air, and this is the most convenient method to adopt with upper rooms. In the case of the ground and intermediate, the discharge can be made direct into the chimney-flue by way of the ordinary valve opening at the site pointed out by Dr. Arnott.

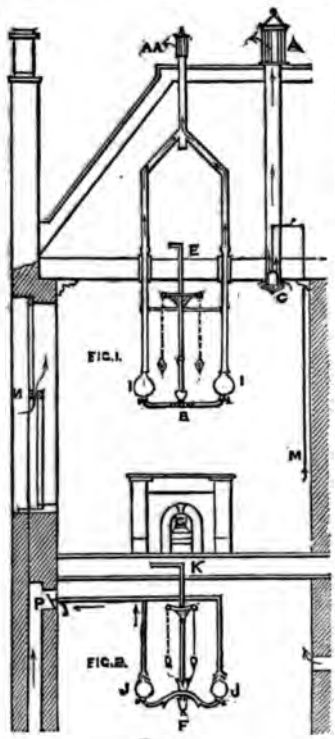


Fig. 2.

Fig. 1, Upper room of a house fitted with Buchan's Ventilated Rising and Lowering Gasalier; B, gasalier, with globe I; E, gas supply pipe; A A, outlet to external air; N, inlet of air.

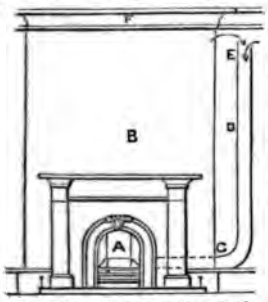
Fig. 2, Lower room gasalier, with foul air collection into flue P of chimney; F, gasalier; J, globe.

C, Ceiling ventilator; P, chimney breast-ventilator at ceiling line; M, cord and pulley.

It may be argued that, if our rooms in which gas is burnt are to be fitted up with such an elaborate system of foul air withdrawal, not only will the cost become a serious item, but the appearance of our apartments will be rendered more or less hideous, owing to the number of tubes and other contrivances. I, however, for one, fail to see a valid objection here, and am every day more convinced that no burner should be fitted up without a special

arrangement for the due removal of the products of combustion. It is easy to see why such should be the case, and those who employ these special means will reap the greatest benefit, both as regards health and the preservation of their furniture and pictures. But, likely enough, few will adopt the reform in its entirety. At the least, however, some special outlets should be provided for the air fouled by gas burning, and I can safely say, from experience, that in many rooms the ordinary outlet in the chimney-breast is ridiculously insufficient, no matter what pattern of valve be adopted there.

A very ingenious method of ventilating a room in which much gas is consumed has lately been invented and given gratuitously to the public by Councillor W. R. Smith, of Glasgow. A zinc pipe six inches in diameter is taken from a point five inches below the ceiling and brought down to within fifteen inches of the floor level, where it is bent into the wall and led through to the space at the back of the fire-grate. Experiments made by Mr. Buchan proved that, when the fire was burning, a constant current of air from the top of the room flowed down the air pipe and up the chimney, which is, in fact, the longest limb of the syphon. When the fire is almost out, the air current through the pipe is still about 100 lineal feet per minute, which is equal to 25 cubic feet. When the fire was well kindled, the outlet current rose to 400 lineal feet per minute, and, with one of the room windows partly opened, the current measured as much as 600 feet per minute. With fresh air inlets this plan would wonderfully assist in keeping the air of the room pure, not only in the daytime, but when the gas was lighted, and the good effects in the latter condition of things would be greatly enhanced were a branch pipe led from each burner to a tube ending at the mouth of the outlet.



Councillor Smith's Vitiated Air Outlet. B, chimney-breast; F, ceiling line; E, top of outlet pipe D, with bend at C into space behind the grate A.

Outlets for the products of gas combustion, combined with a means of ventilating the apartment itself.—At an early stage in the history of lighting by gas, it became evident that this illumining medium could be made useful as an adjunct to the ventilation of the room in which the gas was consumed, and many devices were resorted to in order to effect this. The system invented by Messrs. Haddan and Johnston in 1838 may be described as follows:—The wall of a room was made with a grooved flue covered with a metal plate, and this formed a case to contain the gas-supply bracket-pipe, and also the tube for the removal of the smoke and heated air. The flame was fed with the air necessary for combustion taken from the floor line by means of a tube leading to the glass chimney. Below this intake of air to the burner was an inlet, so contrived that the air could be supplied to the grooved flue in the wall either from the outer air or from the floor of the room at will, and the outlet eventually terminated in the outer air or into a special flue near the ceiling level. The improvement consisted in causing the heat of the gas flame to force various currents of air to ascend into, and out of, or to descend within the room, and so warming, lighting, and ventilating it.

Another modification of this system was applicable to a pendant light. The flame was specially supplied

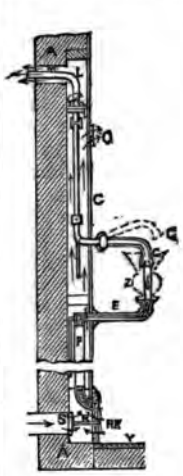


Fig. 1.

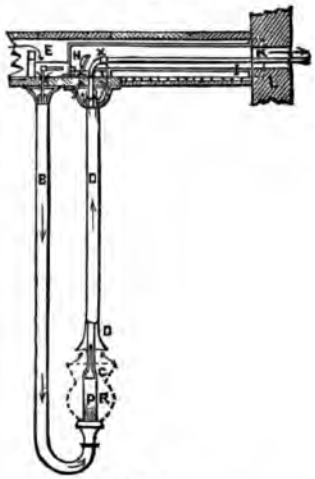
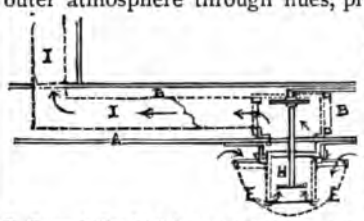


Fig. 2.

Haddan's Room Ventilating Gas Lights. Fig. 1. Bracket Supply. Fig. 2. Pendant Supply. B, tube for supply of air to flame; D, smoke tube; I, tube for withdrawal of the air respired in the room, with outlet in wall between K and L; E, joist.

with air as before, by means of a tube through which the gas tube passes, and a smoke-tube was led from above the globe and glass chimney, which served the same purpose as the grooved flue in the wall behind the bracketed light previously described. The foul air was eventually led to an opening in the wall and there dispersed.

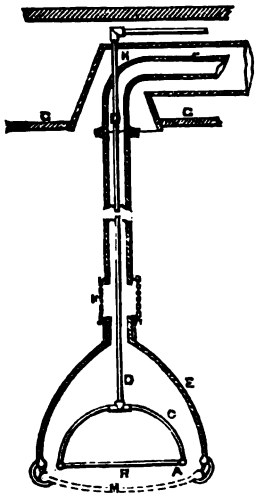
A much simpler method of removing the foul air in buildings and causing it to be conducted to the outer atmosphere through flues, principally through the agency of the rarefaction of the air caused by the burning of gas for illuminating purposes, was invented, in the year 1852, by Mr. R. Brown, of Lancaster. Here a hemispherical shaped vessel of glass, open at the top, is suspended within about six inches of the ceiling, and inside it is placed another and cylindrical-shaped vessel open at the bottom. The gas is burnt in the interior of the inner vessel, and the upper part of this cylinder is connected to a pipe leading to the outer air. The rising current of heated air caused by the flame had, therefore, a tendency to constantly draw off the upper stratum of air near the ceiling, which was, of course, the most vitiated, and causing it to pass through the gas, and thence to the external atmosphere. The inlet of fresh air was obtained at any convenient height in the wall and in the ordinary way, and there was thus a constant ventilation or change of air.



R. Brown's Gas Lighting and Ventilating Apparatus. A, ceiling; B, joists; I, tube between joists; E, glass open at the top; H, gas supply.

The system of Mr. Hine, an architect, of Nottingham, invented in 1858, was as follows:—He made use of a ring of ordinary union, jet, or batswing burners, and over it fixed a glass globe, preferably opalesque. From the top of this globe he led a pipe for the removal of the products of combustion to the chimney-flue. On the outside of the horizontal

portion of the product removing-tube he placed another pipe of larger diameter, and the annular space between these two he meant as a conduit for the supply of fresh air to the room warmed in its passage by its contact with the inner or smoke and burnt air tube. The inlet to this warm air chamber was direct from the external atmosphere.

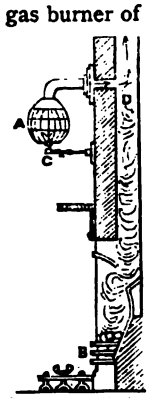


Hine's Gas Lighting and Ventilating Apparatus. A, ordinary burners on the ring R; D, gas supply; E, glass dome; F, metal pipe to flue of fireplace; G, ceiling; H, pipe surrounding F and leading from outer air.

On referring to Benham's Ventilating Globe Light Pendant, it will be observed that such an annular space, though somewhat more contracted, is made to act as an outlet for the air of the room which has been vitiated by respiration, and this function of ventilation is very well performed by its means.

The same wise system of foul air-withdrawal, but in a separate tube connecting with the outer air and joined to a means of opening and closing the valve at ceiling line, will be observed in the illustrations of Mr. Buchan's Ventilating Gasaliers. The steadiness of the outlet is promoted by means of the induced current cowl on the roof.

The last example which I will give of a ventilating gas burner of the above order is one now largely in use, and lately invented by Mr. J. Slater, of Holborn, London. It is designed by him for the removal of the products of combustion when the bracket is fixed near a flue. When no flue is near, the fouled air can be removed by the other well-known means of a separate flue, with assisted upcast power. In a residence the light would be surmounted by a bell-shaped glass, and in warehouses a wire globe would be adopted, such as is used in stables and other buildings to prevent accidents from fire. It has the further advantage of preventing the heating of water or cooking of food over burners unsuited for the purpose, a practice which results in much mischief to the fittings. This form of ventilating tube has been applied with great success to several hospitals, and to the bed-rooms of some large millinery establishments.



Slater's Ventilating Gas Burner Arrangement.

In concluding this part of my subject, I may mention that it has hitherto been a very difficult matter to procure reflecting shades of paper—for use over glass globes—which are entirely free from admixture with arsenical and other deleterious compounds. This is now no longer the case, as this very desirable article, Mr. Field informs me, can be obtained at Messrs. Sharland's, of 69, Fleet Street, London. The amount of mischief done to health in workshops, studies, and places of recreation, where the ordinary green shades are in use can hardly be over-estimated.

(To be continued.)

SANITARY INVENTIONS.

ROCK CONCRETE TUBES FOR SEWERS.

A long and exhaustive paper, on the manufacture and uses of rock concrete tubes, was read at the last annual meeting of the Association of Municipal and Sanitary Engineers and Surveyors, by Mr. C. Fletcher Woods, who superintends this branch of manufacture for Messrs. H. Sharp Jones and Co., of the Bourne Valley Works, near Poole. The author went, with considerable detail, into the process of manufacture, as now carried out under his direction. We have space for only the main points touched upon in a paper, interesting because it records the various steps taken, and the experiments made, before the present perfection of production was arrived at. Sewer pipes of concrete have been used in the United States for the last thirty years. Some laid in New Bedford, in 1845, were recently met with in the course of laying some new water-pipes, and were found in perfect condition. The greatest possible care is used in testing every consignment of cement which comes into the works, and a careful record is kept of these tests. Similar tests also are constantly made of the manufactured material. A feature prominently demonstrated by all experiments is the great toughness of rock concrete tubes. Other qualities of great value and importance are their density and impermeability; Mr. Henry Reid's experiments showing absorption of moisture, after ten days' immersion, to average 1.7 per cent. The average absorption, after twenty-four hours' immersion, by stoneware and fireclay, shown by a number of tests made by Mr. Baldwin Latham, is 3.057 per cent. Rock concrete tubes are applicable to the construction of main sewers, possessing as they do a strength superior to stoneware pipes. Chemically and mechanically, they are as perfect as the finest selected cement, and aggregates, and modern machinery can make them; durability following as a matter of course. The author knew of no instance in which a concrete sewer had succumbed to fair wear and tear. Brick sewers have thus been worn out or eaten away; while hundreds of feet of fire-clay pipe sewers have been pulled up in various places, perfectly rotten, after from six to seventeen years' wear.

The powerlessness of deleterious fluids upon rock concrete tubes has been shown by subjecting them to boiling hydrochloric acid, without deterioration. These qualities of strength, durability, and resistance of the action of any fluid likely to pass through a sewer, render the tubes valuable for the construction of the larger town sewers. In the ordinary sizes they can be used in the same way as stoneware pipes; while for the largest sizes they are invaluable as permanent cores or linings to an exterior casing or ring of coarse concrete. This latter mode of construction is more economical than sound brick sewers of the same diameter. Various sizes are made, from fifteen to thirty inches diameter, the process of manufacture not being adapted to the economical production of small tubes. The material has also been used for man-holes and ventilating shafts. Wells have been lined with them, having diameters of thirty and thirty-six inches. At Bourne Valley, water tanks constructed of rock concrete have been found a success. In the form of sewer-pipes, we learn that Rock concrete is very rapidly coming into use, and with very satisfactory results to those engineers who have given the tubes a trial.

CONGRESS
OF THE
SANITARY INSTITUTE
OF GREAT BRITAIN,

Held at Croydon from October 21 to October 25, 1879.

ORIGINAL PAPERS.

ON CERTAIN POINTS WITH REFERENCE TO DRINKING-WATER.*

BY FRANCIS S. B. DE CHAUMONT, M.D., F.R.S.,
Professor of Military Hygiene, Army Medical School, Netley.

MUCH controversy has taken place with reference to the subject of drinking-water, and, indeed, we may say that no part of the wide field of hygiene has formed more frequently the battle-ground of the partisans of different theories. Many things have contributed to this: a too great tendency to generalisation from insufficient data; a too great dependence upon the dogmatic opinions from time to time enunciated; a tendency to misrepresent the views of opponents, etc. All those things retard true progress, and are apt to bring hygiene more or less into discredit. Thus, it is asserted by some who are opposed to the so-called 'water theory' of disease, that its supporters insist that this is the only means of propagation. I need hardly point out that this is erroneous; for I am not aware that this has ever been insisted upon by anyone whose opinion has carried any weight with it. Another accusation is this: that, by demanding the presence of a germ or *materies morbi* in water as a *sine quâ non* for the production of a specific disorder, the science of hygiene is actually retarded, and attention drawn away from the necessity of having pure water at all times. Here again is, I think, a mis-statement of the case, for no one has advocated the use of impure water (if we except the address of the late Sir Wm. Fergusson, which was an instance of an eminent man stepping out of his way to treat a subject which he had not sufficiently considered). But, on the other hand, we have been obliged to admit that in some, perhaps indeed many, instances, water undoubtedly impure has been consumed for a length of time, without positive disease being directly traceable to it. Still, that is no reason why impure water should be used, and none are likely to recommend it. For we are all ready to admit, to some extent at least, two points, viz.: 1. An impure water is probably more likely to form a favourable *nidus* for disease-poison, whatever that may be, than a pure one; and, 2. It is, at least, not unlikely that the prolonged use of an impure water renders an individual more open to attacks of disease, should he be exposed to them. But there is also another side to the question: there exist cases where the evidence seems fairly convincing that disease has been propagated by means of water which our present means of examination fail to detect the impurity of. But in this there is nothing contradictory, for assuming for a moment the verisimilitude of the germ theory, we recognise the extraordinary minuteness of some of the bacteroid points, which tax the powers of our best microscopes to recognise them. Should those organisms be propagated by means of conidia, how much more minute must they be! And if, as has been suggested by Mr. Sorby, we have already reached the greatest power of penetration by means of lenses, it is quite conceivable that we may never see a germ, even supposing it positively exists. It will also be evident that, if microscopic investigation fail to reveal its existence, still less can we hope much from chemistry in this direction.

It must not, however, be understood from these remarks, that I look upon either chemical or microscopical research in this direction as valueless: on the contrary, I think they are of very considerable value, but the value has, in my opinion, been both overrated and underrated. Thus, it has been overrated when chemists have proposed to lay down certain hard and fast lines as to the quantity of constituents to be considered as admissible; whilst it has been underrated by those who, disgusted and discouraged by an overweening dogmatism, have given up chemistry and the microscope in despair. What, then, is the position that the examination of water occupies at the present time? First, with reference to the chemical question. The most important point is, undoubtedly, the quantity and nature of the organic matter, and any condition of the water that may influence its changes or actions. Various plans for its estimation have been adopted, but I propose to direct attention only to the so-called albuminoid ammonia method, and to the use of the permanganate of potassium. These two are the easiest of application on the whole, and if intelligently applied, they give information of some value. The former plan has been extensively used in this country, the latter being more commonly employed abroad. Following the limits laid down by Prof. Wanklyn, it has been customary to adopt 0.08 of a part per million as the limit of albuminoid ammonia in first-class drinking water, and that any going beyond 0.10 is to be considered a dirty water. Indeed, Mr. Wanklyn goes so far as to look suspiciously upon a water with more than 0.05 if there is a notable amount of free or saline ammonia. In a good many instances this rule has been applied with some rigour, and water has been condemned unhesitatingly when judged by it. But it is obvious that this method tells us little or nothing of the *nature* of the organic matter, and, chiefly, whether it be vegetable or animal. When the albuminoid ammonia is well marked, and we have at the same time a good deal of free ammonia, the conclusion usually drawn is that the contamination is animal; on the other hand, in the absence of the free ammonia, it is assumed to be vegetable; and the question is still further modified by the presence or absence of chlorine. But supposing we do assume that the organic matter is vegetable, is this sufficient? By no means: in some cases, vegetable matter has been shown to be at least *probably* hurtful, in the way of inducing diarrhœa, etc.; but in others, a considerable quantity may exist without any harm resulting. This is especially the case with peat waters, which contain a large amount of albuminoid ammonia, and would be condemned by some chemists on that account. If we did so, however, we should have to condemn a large part of the water supply in Ireland, and in my opinion, very unreasonably. For instance, a number of samples from that country have come from time to time into my hands, with reference to

*Read at Congress of the Sanitary Institute of Great Britain, Croydon, October, 1879.

the water-supply for the troops, but where I was satisfied that the organic matter was of peaty origin, I have not condemned the water, even although the albuminoid ammonia was large. Thus, a sample from the water-works supply at Waterford yielded no free ammonia, but 0.28 of albuminoid; samples of the Vartry supply from Dublin barracks yielded 0.132 and 0.156 of albuminoid, without any free ammonia. I am afraid some chemists would have condemned those samples, but, feeling satisfied that it was vegetable matter, I did not feel myself justified in doing more than pointing out that the filtration at the company's works was imperfect, as indicated by the somewhat numerous organisms shown by the microscope. Again, with reference to the permanganate test; this we generally use at Netley with sulphuric acid and heat, reckoning the results as so much oxygen required for the destruction of the organic oxidisable matter, taking care to separate this from the nitrous acid. As a limit, 1.0 milligramme per litre may be laid down as a general guide, but much latitude must be allowed: thus, the peat waters above alluded to, yielded from 1.14 in the Vartry, to 3.0 in the Waterford supply. Such a quantity would be very objectionable with animal impurity, but it is probable innocuous with vegetable.

It may, therefore, be stated as a general principle, roughly applicable, that, if we can be fairly assured that the impurity in a sample of drinking-water is vegetable, the limits usually laid down may be considerably exceeded, without it being incumbent on us to condemn the water. But now comes a second question. Is this true of all vegetable matter? We may take it as generally true of peat or moorland waters, but under some circumstances it may not be true. It would, for instance, not be true in the case of contamination from marshes of a malarious character, where I should be inclined to make the limitation decidedly narrow; or in contamination with vegetable matter from malarious districts, such as is reported by Dr. Smart, in the Rocky Mountains country; or where poisonous plants abound, etc. In the case of the Leek workhouse, Professor Wanklyn believed diarrhœa to have been caused by vegetable contamination; this may have been the case, but the evidence seems inconclusive.

The next point of importance is the significance of free ammonia, or saline ammonia, as it is sometimes called. Here the limit has been put very low, only 0.02 parts per million. When present along with albuminoid ammonia, but without much chlorine, it is taken to show contamination with sewer-gas as probable; with a marked amount of chlorine and albuminoid ammonia, contamination with sewage; with little or no albuminoid ammonia, but with a good deal of chlorine, contamination with urine; with neither albuminoid ammonia, nor chlorine, vegetable, perhaps marshy, contamination. Even assuming that those inferences are correct, it is obvious that two or more of the conditions might coexist, and so interfere with the diagnosis. But is it certain that they are correct? Not in all cases, I think; particularly where urinous contamination is asserted of waters containing much free ammonia and chlorides, but without albuminoid ammonia. These characters are met with, not unfrequently, in deep well-waters, artesian wells, in fact, where recent contamination cannot be urged. Thus, the well in Trafalgar Square yields (per million) about 0·85 of free ammonia, and 165.5 of chlorine (11.585 grains per gallon), and its analysis, I believe, at first caused Professor Frankland to have suspicions of sewage contamination. But other wells are found to yield similar results. Thus, two samples from deep wells (about 240 feet) at Parkhurst, yielded, respectively, 0.924 and 0.936 parts per million of free ammonia, no albuminoid ammonia in one case, and only a trace in the other; and from four to five grains of chlorine per gallon. Contamination is hardly to be thought of. But perhaps one of the most curious is the instance of the Spithead Forts. From a well sunk in the outermost one, at a distance of at least two miles from land, a sample was sent to me; it contained 0.5428 per million of free ammonia, no albuminoid, and about 3.9 (grains per gallon) of chlorine. Contamination here is out of the question. But where does this free ammonia come from? It is not possible to say, positively; but in all likelihood from old organic matter, which has undergone conversion into ammonia, but has not passed into the farther stage of nitric acid. The experiments of Schliessing and Munz, and of Warington, have confirmed the suggestion of Pasteur, that nitrification is a fermentative process, requiring a peculiar organized ferment for its operation—the addition of substances known to be fatal, or at least obstructive, to low forms of life, being efficacious in arresting the process. In the samples in question, especially in that from Spithead, there was no sign of animal or vegetable life on microscopic examination; and we may, therefore, conclude that the persistence of the nitrogen, in the form of ammonia, was due to the absence of the ferment necessary to complete the process of nitrification. This seems to me the most probable explanation of the apparent contamination of deep-well waters, which has been a source of puzzle to a good many people.

The above remarks tend to show that, in addition to the mere chemical knowledge of the constituents, information as to the source, its nature and surroundings, and in fact as much as we can possibly get about the water, are necessary to form a correct judgment. At the same time, the laying down of certain limitations as to quantities is useful as a foundation to work upon; and this may be seen by a reference to the table, which shows the means of 223 samples, analysed and reported upon at Netley.

Table of the average amounts of constituents in drinking-water according to class.—Means of 223 samples.

Class.	Chlorine in grains per gallon.	Ammonia in milligrammes per litre.		Oxygen required for oxidisable organic matter in milligrammes per litre.	Nitrous acid (NO_2) in milligrammes per litre.	Hardness Clark's Scale.	
		Free.	Albuminoid.			Fixed.	Total.
'Fit for use,' or free from marked organic impurity (54 samples)	2.2045	0.0050	0.0258	0.3611	0.2097	5.06	12.25
'Usable,' or requiring filtration before use (103 samples)	2.3367	0.0843	0.2062	0.8200	0.3430	5.94	11.55
'Unfit for use,' on account of organic impurity (66 samples)	4.2612	0.4783	0.4337	0.7977	0.5927	7.71	14.68

Of these fifty-four were pronounced to be 'fit for use', that is, that no excessive impurity could be detected chemically; 103 were pronounced 'usable', or 'required filtration'; and sixty-six were positively con-

demned. It will be seen that the class of 'fit' lies well within the limits laid down with reference to organic constituents, and that there is a progressive increase in the two other classes. Even in the chlorine this is also observable.

Let me now say a word with reference to the mineral constituents. Here we find grounds for difference of opinion also, and it is much to be desired that some uniformity should be arrived at. At present we have the unedifying spectacle of one analyst declaring a water fit for drinking, and another condemning it. A controversy of this kind, I believe, is going on at this moment between two eminent chemists in London. It may be difficult to lay down any fixed rule, but something might, I think, be arrived at that would remove this discrepancy. Within some limits a difference of opinion is likely to exist, but surely a *via media* could be found here more easily than in the case of organic impurity. Some think a water of a certain hardness necessary, and condemn too soft waters; others hold a directly opposite opinion. Some even recommend the addition of salt to water; others are inclined to condemn water with even a moderate quantity of salt. In one case the sample is condemned by one chemist as unfit for washing, but allowed to be fit for drinking; whilst another condemns it for both purposes. I have myself a small experience in this direction. A series of samples lately submitted to me I felt obliged to condemn as an ordinary water-supply, on account of the large amount of mineral constituents, such as more than 140 grains per gallon of solids, of which at least 85 were chlorides and 10 were magnesia; fixed hardness 49 degrees of Clark's scale. Of this water I said that it might be used in case of great emergency, but that as an ordinary water-supply it was very unadvisable, especially in the case of children or the sick, in whom it would be apt to produce diarrhœa, and perhaps aggravate other diseases. It was also, I reported, unfit for washing purposes on account of its hardness. I may mention that the source of the water was near the sea, and that it was free from organic impurity. A sample was sent to an eminent analyst in London, whose analysis agreed in the main with my own, but the conclusion he drew was, that it was a good water, fit for all domestic purposes. Now, what is the public to think of those discrepancies? Is it likely that confidence will be placed in analyses, or is it a wonder that people should declare that chemists—water analysts especially—and their work require rehabilitation?

On the other hand, difficulties arise which analysts have to contend with in ways that are but little appreciated by the public. For instance, I have had samples of rain-water sent to me which proved full of various kinds of impurity, but I have had some difficulty in getting it admitted that such a thing was possible. 'But it's rain-water!' people say. Very true; but still it is impure. We might further answer, that for the matter of that all water is rain-water, but the preservation of its purity is a question of collection and storage, whether these be done by nature or by man. Of the cases of contamination that have come within my observation, the following are a few. By spray from the sea—by soaking from salt marshes into the collecting tanks—by smoke products and house refuse—by taking up caustic lime from the cement of tanks—by pigeon-droppings from house-roofs, etc. These are only some, and not the most dangerous, sources of impurity. Another source of difficulty is carelessness in collection of the samples. A case illustrating this recently occurred to me. Samples from the top and from the bottom of a well were sent for examination, two bottles of each. The bottom sample and one of the bottles of the top sample were fairly good, but the second bottle of the top sample was dirty and offensive, the sediment apparently consisting entirely of fatty matter. I reported that the two samples seemed from the same source by the mineral analysis, but that probably something had got into the one in question at the time of collection, assuming the bottle to have been clean. On inquiry it turned out that to obtain the sample a man had to be sent down the well with a candle, the tallow of which had quietly dropped into the well and been carefully bottled off with the sample! Still another difficulty arises from want of care as regards cleanliness of the vessels in which the samples are sent. I have had some sent in old pickle-jars, castor-oil bottles, turpentine bottles, physic bottles of sorts, with corks of a most ancient and fish-like smell. To analyse such samples is simply waste of time.

The best of all examinations is that which is made by the analyst on the spot itself at the very source of supply. If that be impossible, then the most scrupulous care should be taken about the collecting of the sample and its transmission in clean glass-stoppered bottles, with every detail of information that can possibly be furnished.

I should have wished to say a few words about the microscopic examination of water, but my paper has reached the prescribed limits, and I will therefore merely urge the importance of not neglecting this branch of the inquiry. It may be said that it has not as yet done much for us; still it does furnish us with some information, and if we desire more, it is only by persistent observation and carefully noting what we see and the circumstances under which the objects are seen, that we are likely to extend our knowledge in this direction.

ON COMMON LODGING-HOUSE ACCOMMODATION.*

By Francis Vacher,
Medical Officer of Health for Birkenhead.

If there be a single individual in whose well-being all concerned in the maintenance of public health should take a special interest, it is the poor traveller. Nor is this unrecognised. So long ago as 1848 the State realised that to neglect the poor traveller and his environment was to imperil the health of the community; and, accordingly, in the Act for promoting the Public Health passed in that year, local boards were required to register common lodging-houses, and to make bye-laws, fixing the number of lodgers that may be received, for promoting cleanliness and ventilation, and with respect to inspection. Again, in 1851, it appeared to the Legislature that 'it would tend greatly to the comfort and welfare of many of Her Majesty's poorer subjects, if provision were made for the well-ordering of common lodging-houses', and the Act of 1851 was passed. But, except that it empowered local authorities to make bye-laws in the interests of morality† as well as health, little was effected by this measure. After

* Read at the Congress of the Sanitary Institute of Great Britain, at Croydon, October 1879.

† The words used are, 'for the well-ordering of such houses, and for the separation of the sexes therein'.

some experience of the working of these provisions, it must have been found that lodging-houses and their keepers were still not quite what it was desired to have them, and in 1853 common lodging-houses were once more the subjects of a special Act. It was now required that every common lodging-house be 'inspected and approved for that purpose by some officer appointed in that behalf'; and permission was given to the local authority to 'refuse to register as the keeper of a common lodging-house a person who does not produce a certificate of character', signed by three inhabitant householders. By the Act of 1851, a keeper was required to advise his authority when a lodger became ill with an infectious disease; but by the amending Act, the authority was, for the first time, empowered to remove such lodger, and disinfect or destroy any bedding or clothes used by him. The Act passed in 1853 also required the keeper of a common lodging-house to thoroughly cleanse it, in accordance with any regulations or bye-laws of the local authority, and to the like satisfaction limewash the walls and ceilings thereof, in the first week of April and October in every year. Section 35 of the Sanitary Act, 1866, contains provisions by which a Secretary of State may, on the application of nuisance authorities, empower them to make regulations as to lodging-houses, but the section does not apply to common lodging-houses.

The Public Health Act, 1848, is now repealed, and so are the two Common Lodging-Houses Acts, except so far as relates to the Metropolitan Police District; but the fourteen clauses of the Public Health Act, 1875, having reference to common lodging-houses, scarcely do more than re-enact the old provisions. However, under this Act, the authority's officer has freer access; and every keeper is required to mark his premises in some conspicuous place outside, as a registered common lodging-house.

And now let us see how these arrangements for registration and regulation work. The regulations adopted in most districts have been probably in accordance with those issued under the authority of the Secretary of State. Even since the repeal of the Common Lodging-Houses Acts, the old regulations, so long regarded as models, have still held their ground. These, however, as anyone who has had experience in the matter will admit, are insufficient to accomplish the object sought. For example, take the following extract from Regulation 8:—'The blankets, rugs, or covers used in such lodging-house shall be thoroughly cleansed at least four times every year, that is to say, at least once some time during the first week of each of the several months of March, June, September, and December.' Is this sufficient for cleanliness? Or take Regulation 11, in which the existence of lodging-houses without yards is clearly recognised, and two or more houses uniting to provide a single 'convenience' is sanctioned. I would draw attention, also, to Regulation 12, requiring that 'the sink in the yard shall be so placed as to take all waste water through the drain from the closets', which is certainly not an arrangement to be commended. There is nothing to be gained by criticising further these regulations, more especially as they now have no official authority, yet I believe that the regulations this day hung up in most common lodging-houses are little, if at all, in advance of the models.

And what is the result? I will tell you. The poor traveller arrives in a town and goes in quest of lodgings. He is a decent man, and particular that the house he selects shall be a registered one, as he thinks this gives him some guarantee that his quarters shall be clean, airy, quiet, and well-ordered. He pays his fourpence, and is admitted by the 'deputy', who represents the only authority in the building, the actual proprietor being a publican, an eating-house keeper, or marine store dealer—that is non-resident. The room he is shown into (the only one in the house not a bed-room) is already more than sufficiently full with men, women, and children. One lodger is frying tripe, another toasting herrings, two or three are drinking and smoking, while in a corner it may be a woman is busy washing clothes. Unless the new arrival is willing to join in the drinking and singing and pay for a share of the beer, a seat is only found for him grudgingly. In any case, he can scarce stay long in this room without getting a headache, so he leaves the convivial party and goes to bed. But up with him, too, comes the stream from the washing-tub, and the tobacco smoke, and the smell of many savoury suppers. The wooden bedstead is old and infirm, and the tick upon it is filled with flocks hard with much lying on, and the covering is a folded blanket. Bedstead, bed, and bed-clothes are all dirty, and with a sigh the poor traveller prepares for his night's experience. Taking a look round, he notices the entire furniture of the room consists of three bedsteads, an iron bucket, and a line stretched across from wall to wall, on which he hangs such of his clothes as he divests himself of. The fustiness of his surroundings, the noise and fumes from downstairs, combine to keep the poor traveller awake till the revellers join him. Two turn into each of the other beds, and his bed-fellow, not steady enough, it may be, to attempt undressing, lies down, boots and all. What is the poor traveller to do? He is too hot in summer, too cold in winter. He wants a draught of water—he cannot have it. He wants to bathe his face—he cannot do it. In superlative discomfort, he keeps his vigil, perhaps till early dawn, when,

> 'Wearied out he sinks to sleep,
> To sleep, but not to rest.'

This is no mere fancy picture. I have never played the part of an amateur common lodger, but I have visited many registered houses in the daytime, in the evening, and in the early morning hours, and I describe to you what I have seen. I ask you now, as I have often asked myself, Is the poor traveller fairly dealt with? We pretend to take a special interest in him, and see that he is provided with a clean bed, sufficient breathing space, and a tidy room in a well-ordered house, and we stamp the room and house with our official stamp to show that we are really in earnest. He respects the sanitary authority, and learns too late that it sanctions dens of dirt and overcrowding and impure air.

What has been and is required as regards common lodging-houses is the repression of overcrowding, and securing cleanliness, efficient ventilation, and decency. To obtain this, two things are necessary—(1) a well-considered set of regulations, and (2) due provision for systematic inspection. The second is at least of equal importance with the first. A well-ordered common lodging-house is, then, perfectly practicable? Undoubtedly in large urban centres it is. Nay, more; in Glasgow, Liverpool, Manchester, Birmingham, Bristol, etc., it is an accomplished fact. The difficulty I am speaking of does not arise in large cities and boroughs, where the accommodation required is on a large scale, and readily afforded by private enterprise, and where inspection is systematic, and in the hands of properly

trained inspectors. It is not of the great populous centres the poor traveller has reason to complain, but of urban districts, where precisely the opposite conditions obtain, where it will pay no one to open a big house as common lodgings, because the sum of the beds there is a demand for is so small, where there is no systematic inspection, no night inspector, no security as regards the separation of the sexes. The local authority I serve, I regret to say, is much in this position. We have but eight common lodging-houses on our register, all situated in the same neighbourhood (five being in the same street), and all in poor squalid little dwellings. The sum of the beds registered is forty-eight.

What is to be done by towns thus circumstanced? It is a perfectly hopeless task attempting to reform the existing common lodging-houses. The one course which promises satisfactory results is for the authority itself to provide the requisite accommodation. This, however, the sanitary authority has no power to do. It may provide public baths, wash-houses, open bathing places, infectious diseases hospitals, disinfecting houses, patients' conveyances, vans for the transfer of clothes, and mortuaries. Why may not urban authorities provide common lodging-houses? It is surely of as great importance to a town that its poor shall be wholesomely lodged as that they shall have facilities for washing themselves and their clothes. The Public Health Act ought to have given us this power, and when the opportunity occurs, steps should be taken for securing it. Even if reform of the wretched hovels called common lodging-houses, as they exist in most small towns, were possible, it could not be accomplished at a less cost than the provision of lodgings which should be absolutely perfect. In ordinary cases, I would not advocate the erection of a special building, but the hiring of a pair of suitable houses, one for male, and the other for female lodgers. A man and wife could be put in as caretakers, and these being the servants of the sanitary authority, would of course act as night inspectors. Each house should have a sitting-room, kitchen, and wash-house, and the bedrooms should be furnished with small iron bedsteads. The ventilation should be automatic, and independent of the opening and shutting of windows.

I shall not go further into details; but I think it will be seen that the plan is quite feasible, if only the Sanitary Authority had the necessary powers. Such an establishment as I propose could never be overcrowded; there would be no double beds in it, and it would be at all times cleanly, tidy, airy, decent, and well-ordered. As for the keepers of the old lodgings, they would soon find their occupation gone, and in course of time their houses would be put to some other uses.

I trust that what I have said may have succeeded in awakening sympathy for the poor traveller, and drawing attention to some of the circumstances of his surroundings. Each individual has a personal interest in giving this matter his earnest consideration, for the baneful effects of neglecting common lodging-houses are not restricted to their occupants.

The sewerage works for the district of Yardley are now completed, under the supervision of Mr. Pritchard, C.E., by whom they were designed, and have been formally handed over to the Solihull Rural Sanitary Authority.

SANITARY ENGINEERING.

By Capt. Douglas Galton, C.B., Hon.D.C.L., F.R.S., etc.

Capt. Galton commenced by saying that all living beings are in a continual condition of change, which results in their throwing off from the body matters which poison earth, air, and water, unless space, time, and opportunity are afforded for the counteraction of these deleterious effects, and then proceeded:—Epidemic diseases are observed to occur in very different degrees of intensity at different periods, amongst groups of population exposed to certain unhealthy conditions. Sometimes they take the form of pestilences, and immediately afterwards, the conditions remaining the same, they subside and all but disappear, again to renew their ravages at some future period. A careful examination of their phenomena has led to the discovery that whilst we have no knowledge of the causes which made these epidemics break out at one time and not at another, there are certain well-defined conditions which influence most materially, not only their actual intensity but also their frequency. Thus, intermittent fever was observed to disappear from places which it formerly ravaged, after drainage of the soil and improved cultivation. It was next discovered that by cleanliness, fresh air, and diminished crowding, the worst forms of pestilential fever, which used to commit ravages similar to those of the plague, disappeared entirely from English gaols. The breathing of foul air contaminated by the breath of other persons, appears to be the special agent which predisposes people to consumption and diseases of that class. Zymotic diseases—namely, fevers, diarrhœa, cholera, dysentery, etc., are most intensely active where there is over-crowding, and the repeated breathing of air already breathed, such air being further contaminated by moisture and exhalations from the skin; and where there are emanations proceeding from animal excretions, or from decaying vegetable matter, together with moisture, from the want of drainage, from urinals, cesspits, and manure heaps. Moreover, cholera and dysentery are intimately connected with the condition of the water supply; while an epidemic prevails, the question whether a given population shall suffer or escape may almost be predicted from a chemical analysis of the drinking water.

It is to the physiologist and the chemist that we must look for the causes from which these baneful effects arise, and what are the conditions which should be altered to prevent or remove them. The engineer steps in after these causes have been pointed out, and it is for him to design the methods of prevention or removal.

Five hundred years ago the population of the whole kingdom was only equal to the present population of the metropolis. When the first recorded census was taken in 1801, the population of England and Wales was less than 9,000,000; it has now reached nearly 25,000,000. We are crowded together as we were never crowded before; our pursuits are more sedentary, our habits more luxurious; houses increase in number, land is more valuable, the green fields more remote; our children are reared among bricks and paving-stones. It is daily becoming more and more impossible, in the question of health, for any one member of a community to separate his interest from that of his neighbours. If

* Read at the Sanitary Congress at Croydon, October 1879.

he places his house away from others the air which he breathes may receive contamination from the neighbouring district; the dirty water which he throws away may pollute the stream from which his neighbours draw their supply; and when a population congregates into towns the influence of the proceedings of each individual on his neighbour becomes strongly apparent.

In places where many dwellings are congregated together, the requirements for health may be classed as—first, those that are common to the community, such as the supply of good water, the removal of foul water, and the removal of refuse matter; and secondly, those which immediately concern the individual householder, such as the condition of his house and the circumstance of its occupation. But the existence of some danger to health in houses in towns and villages may be a source of danger to the houses around. In my own case, illness was caused by my next-door neighbour having a defective soil-pipe, the sewer-gas from which passed through the wall. This was a danger from which perfect drainage in my house afforded no protection.

Each year, as the population increases and as dwellings multiply, so does the importance of promoting these conditions increase; and so long as preventible diseases exist throughout the country, we must not delude ourselves with the idea that we have done more than touch the borders of sanitary improvements. There are few subjects in which so many professions of progress have been made in the last few years as in the theoretical knowledge of how to provide a healthy dwelling and a healthy town.

Books innumerable have been written upon the question. Physiologists have invented every conceivable theory; patentees have invented every conceivable description of apparatus; engineers, architects, and builders overwhelm you with professions of their knowledge of sanitary principles, and millions of money have been spent in furthering the schemes they have devised; and yet, in spite of all these efforts, there are few houses and very few towns where you would not easily detect some grievous sanitary blunders.

It has always seemed to me that the system under which the Government advances money for sanitary works, whilst of great *primâ facie* advantage in one point of view, yet has its disadvantageous aspect. The facility with which corporations and local boards have been enabled to borrow money at a low rate of interest, has no doubt had the effect of inducing a more immediate expenditure for sanitary works than would have taken place without this aid. But the expenditure has not, in all cases, been so carefully considered beforehand as would probably have been the case if the towns had been left to raise the money without Government aid. The result has been that much money has sometimes been spent where it has been subsequently seen that less money, carefully and judiciously applied, would have sufficed.

There has also been in the system of loans to towns a tutelage by the Government, which diminishes responsibility. Where a loan is applied for, the plan upon which the money is to be spent is submitted for Government approval. The Government only lends the money after the approval of the proposed scheme of expenditure by one of their inspectors.

The local authorities of the towns to be drained cannot, therefore, be responsible for the plan selected; for the local authorities must alter their plans to suit the views of the inspector. The responsibility of the engineer is diminished, because he may be compelled to modify his plan in a manner of which he may not thoroughly approve; and the inspector has no responsibility in the matter, because, after having approved of the general scheme, he has no control over the details or the execution of the work, nor can he be in any way held responsible if the result were a failure. Indeed, after the money has been once borrowed, there is no certainty that it need be spent in accordance with the plans. I have heard a rumour that, in one instance at least, a scheme has been approved, the money has been borrowed, and never spent at all on the work on account of it which it was borrowed. Nor is there any apparent reason why the Government should have come forward to press money upon the corporations.

The plan adopted by the Government in former times for promoting land drainage would have answered equally well in the case of sewerage works. The Government commenced by assisting landowners, with loans granted on the security of their estates, the money being expended on a system of drainage approved by the Government inspector. But when the system had been initiated, private enterprise was allowed to take its place, and companies were formed who advanced the money and employed leading engineers to advise upon its expenditure; and the intervention of the Government was no longer necessary.

A similar course of proceeding would have been applicable in the case of town drainage. If the Government, instead of becoming themselves money-lenders on so large a scale, and thus constituting their inspectors the sole advisers on matters of drainage, had passed an Act of Parliament enabling any town to borrow an amount of money, bearing a due proportion to the rateable value of the town, a sound security would have been created; and if large companies had taken upon themselves the function of lending to towns under a system similar to that in force for land drainage, viz., of satisfying themselves, through the advice of a leading engineer, of the probable efficiency of the plans for which money was advanced, a greater scope would have been afforded for progress in sanitary science. Indeed, I cannot but think that we should have reached a higher level of sanitary improvement in this country than now prevails, if the Government had limited itself to its more legitimate functions, viz., first, the enactment of laws requiring sanitary defects to be removed; and second, the promotion of measures for diffusing a sound education in sanitary knowledge; instead of pursuing the course of endeavouring to dictate the exact measures to be followed in each case.

But it may be asked, What is sanitary knowledge? It is frequently assumed that drainage and water-supply are the principal subjects which are embraced in the term; but these only make up a small part of the subject.

At the present time there does not exist any treatise which brings to a focus the various problems of mechanical and physical science, upon which sanitary knowledge is based. The variety of these problems will be best illustrated by a few instances. A sanitarian tells us that health depends on pure air and pure water. If a site is to be selected, it requires a consideration of its position with respect to its surroundings. It requires a knowledge of the temperature of the air and of the soil; what are the

prevailing winds; what is the amount and incidence of the rainfall; and what is the percolative capacity of the soil. The engineer cannot interfere with the general conditions of a climate, but he may produce important changes in the immediate surroundings of a locality: he may modify the conditions and temperature of the soil; he may control atmospheric damp; he may arrange for the rapid removal of rainfall, or he may cause the rainfall to be retained in the soil, to be given out gradually in springs, instead of passing away in torrents to flood the neighbouring districts. In the Island of Ascension, the power of retention of water in the soil exercised by the planting of trees was exemplified. That island formed a convenient point for ships to call at for obtaining water on their way home from the East Indies. It was a barren rock, to which formerly the water had to be conveyed in ships. About fifty years ago trees were planted on the island. These have thriven, and now the rain which falls, instead of passing away at once into the atmosphere, by evaporation, is retained in a sufficient quantity to enable the water to be collected for the supply of the ships which call at the island.

The engineer may modify the incidence of disease. Algeria, perhaps, offers some of the best illustrations of the manner in which engineering operations have remedied the evils of the proximity of marshes. Bona stands on a hill overlooking the sea; a plain of a deep rich vegetable soil extends southwards from it, but little raised above the sea level. The plain receives not only the rainfall which falls on its surface, but the water from adjacent mountains, and is consequently saturated with wet. The population living on and near this plain suffered intensely from fever; entire regiments were destroyed by death and disease. It was at last determined to drain the plain. The result of this work was an immediate reduction of the sick and death-rate. When a site has been selected, it is necessary to consider the question of the subsoil. The air does not cease where the ground begins, but air permeates the ground and occupies every space not filled by solid matter or by water. Thus, it is the same thing to build on a dry gravelly soil, where the interstices between the stones are naturally somewhat large, as to build over a stratum of air. The air moves in and out of the soil in proportion to barometric pressure, and with reference to the wind. If there is much water in the soil, the air carries with it watery vapours, and is cold, and such a site is called damp. A site with a high-water level is, as a rule, more unhealthy than a site with a low-water level; but a site with a fluctuating water level is most unhealthy. The sanitary engineer can control the water level in the soil, or construct works to remedy the evils of a wet site.

There is also a considerable quantity of carbonic acid in the soil. It varies at different depths; it has been found to vary greatly even in localities in close proximity. The processes going on in the soil in these several places are therefore probably very different. Each will have its influence on the ground air. One evil arising from a foul subsoil is very apparent. In cold weather the temperature of a house is warmer than that of the outer air. If a house is built on soil containing deleterious matters, the impure air will be drawn into the house by the action of the warm air of the house. The sanitary constructor takes measures to check the passage of air between the house and the ground under and around it. The fact of this continual free passage of air in and out of the ground makes it important that not only should the ground lived on be free from water, but that it should also be free from impurities. It would be just as healthy (indeed, probably far healthier) to live over a pigsty than over a site in which refuse has been buried, or in which sewer water has penetrated, or over a soil filled with decaying organic matter; thus, before building on any ground, its nature should be carefully examined. What then can be more dangerous, what more wicked, than the everyday proceedings, in the metropolis and elsewhere, of those persons who purchase a building site, who extract from it the healthy clean gravel and sand which it contains, allow the hole to be filled up with rubbish, and then proceed to build upon it?

When the site has been selected, the sanitary architect has to consider how he will distribute buildings over it. The deteriorating effect of residence in towns has been frequently noticed. The Registrar-General has shown that a population of 12,892,982 persons living on 3,183,965 acres in the districts comprising the chief towns of England, showed an average death-rate, for ten years, of 24 4 per 1,000; whilst a population of 9,819,284, living on 34,135,256 acres in districts comprising small towns and country parishes, showed an average death-rate for a similar period of 19.4 per 1,000.

It has been calculated that of the adult population of London 53 per cent., of that of Birmingham 49 per cent., of that of Manchester 50 per cent., and of Liverpool 62 per cent., were immigrants from the country settled in the town, and that the majority of the incomers were men and women in the prime of life. The mortality in these four towns averaged 26 per 1,000 against 19 per 1,000 in the adjacent country districts; the mortality of persons under the age of 15 being 40.7 per 1,000 in these towns against 22 per 1,000 in the country districts. The marriages in the city population were four times as numerous as in the agricultural counties, but the births in the town population only exceeded those in the agricultural population by one-sixth. When we consider the causes of low health in towns it becomes apparent that the extraordinary degree of unhealthiness is unnecessary.

It will be found to result from absence of circulation of air through and between buildings, and from the retention near or in houses, and in streets of much polluting matter. The following figures illustrate this:—St. Anne's, Soho, with 331 inhabitants per acre, shows a death-rate of 24.16 per 1,000; Eltham, with 1.04 inhabitants per acre shows a death-rate of 18.8 per 1,000; the model lodging-houses with 860 inhabitants per acre, show a death-rate of 16. per 1,000; the model lodging-houses, with 1,140 inhabitants per acre, show a death-rate of 18. per 1,000. Thus some of the model lodging-houses are as healthy as a country district.

The superior healthiness of the model lodging-houses is due in a measure to the careful provision of sanitary arrangements, but principally to the fact that the numerous stories in these buildings, whilst affording accommodation for a dense population on a limited area, are provided with free through ventilation, and allow of ample space all around for the circulation of air, as well as to the fact that impurities are not allowed to be retained on the open area round them.

The health of any building is dependent upon free and moving pure air, outside and inside its walls; anything which interferes with this first condition of health is injurious. And it follows that in towns,

where land is dear and a large number of persons are crowded on a given area, better ventilation and circulation of air may be obtained by placing dwellings in stories one above the other, and leaving spaces between the buildings, than by placing them in one-storied buildings which would be too close together to allow of circulation of air round the building. The next step in knowledge of sanitary construction is to learn how to obtain pure air in a building. What is pure air? What are the impurities which make the air of a town so different from the fresh air of the country? The volume of sulphuric acid from coal thrown up by our fires into London air is enormous. A cubic yard of London air has been found to contain 19 grains of sulphurous acid. The street dust and mud is full of ammonia from horse-dung. The gases from the sewers pour into the town air. Our civilisation compels us to live in houses, and to maintain a temperature different from that out of doors. What are the conditions as to change under which we exist out of doors? The movement of the air is stated in the Registrar-General's reports to be about twelve miles an hour on an average, or rather more than seventeen feet per second. It will rarely be much below six feet per second. Imagine a frame about the height and width of a human body, measuring about 6 feet by 1½, or nine square feet: multiplying this by the velocity of movement of the air at 6 feet a second, it will appear that in one second 54 cubic feet, in one minute 3,240 cubic feet, in one hour 196,400 cubic feet of air would flow over one person in the open.

In a room the conditions are very different. In barracks, in a temperate climate, 600 cubic feet is the space allotted by regulation to each soldier; and when in hospital, from 1,000 to 2,500 cubic feet to each patient. If it were desired to supply in a room a volume of fresh air comparable with that supplied out of doors, it would be necessary to change the air of the room from once to five times every minute, but this would be a practical impossibility; and, even if it were possible, would entail conditions very disagreeable to the occupants. Hence, to maintain the comfort and temperature we desire indoors, we sacrifice purity of air. Therefore, however impure the outer air is, that of our houses is less pure; and it may be accepted as an axiom that by the best ventilating arrangements we can only get air of a certain standard of impurity, and that any ventilating arrangements are only makeshifts to assist in remedying the evils to which we are exposed from the necessity of obtaining an atmosphere in our houses different in temperature from that of the outer air.

On the other hand, why should we not do our best to obtain as pure air as we can? It has been recently shown that the soot and many deleterious matters from smoke may be easily removed by passing the smoke through spray on its way to the chimney. This would remove much impurity from town air; but until such a system of purifying town air is adopted, we can improve the air in our houses by removing the suspended matter from the inflowing air by filtration. Moreover, these suspended matters exist in much smaller quantities at an altitude; at 100 feet they are greatly diminished, at 300 feet the air is comparatively pure. In Paris the air for the Legislative Assembly is drawn down from a height of 180 feet, so as to be taken from a point above many of the impurities of the town atmosphere. That is a reasonable and sensible arrangement, and might be usefully adopted in public buildings in towns. In the Houses of Parliament, the so-called fresh air is taken from courtyards on the street level, from which horse traffic is not excluded.

The maintenance of the standard of purity, or rather impurity, in a building, depends on ventilating arrangements. Ventilation chiefly depends on the laws which govern the movement of air, its dilatation by heat or contraction by cold; or, if ventilation is effected by pumps and fans, then upon the laws of the motion of air in channels, the friction they entail, and similar questions; therefore all these are matters for careful study. But when we apply the study to practice, other considerations occur. We are told by theory that a room containing an air-space of 1,000 cubic feet, occupied by one individual, would require to be supplied with 3,000 cubic feet per hour, in order to maintain it in a proper condition of purity and humidity. But in our temperate climate, a careful practical examination of the condition of barrack-rooms and hospitals, judged of by the test of smell, showed that arrangements which appear to provide for a volume of air much less in amount than that obtained by calculation, will keep the room in a fair condition. These results have pointed to about 1,200 cubic feet of air admitted per man per hour in barrack-rooms occupied by persons in health. This need not be set down to errors in calculation or in theory.

There are many data which cannot be brought into the theoretical calculation. For instance, the carbonic acid disappears in a newly plastered or lime-washed room, and could be recovered from the lime; therefore a newly-cleaned, lime-whited room will present different conditions from a long-occupied, dirty room. Washing with quicklime destroys fungi in dirty walls; the same effect is produced by sulphurous acid fumigation. Air has the same property, especially dry air; and hence, opening windows, turning down beds, and all such measures, act directly on the subsequent state of the air. Therefore an enormous effect is produced on all the elements of the above calculation if the windows of a room are kept open for several hours a day, instead of being closed.

Besides this, the conditions under which the air flows in and out of a room are so varied. The walls and ceiling themselves allow of a considerable passage of air. The ceiling affords a ready instance of porosity. An old ceiling, it will be observed, is blackened where the plaster has nothing over it to check the passage of air, whilst under the joists, where the air has not passed so freely, it is less black. On breaking the plaster, it will be found that its blackness has arisen from its having acted like a filter, and retained the smoky particles, while the air passed through. Ill-fitting doors and windows allow of the passage of a considerable quantity of air.

In a temperate climate, where the changes o temperature of the outer air are rapid and considerable, these means of producing the outflow from, and the inflow of air into a confined space are in constant operation. A sleeping-room is very warm when occupied at night, a rapid fall of temperature outside occurs, and at once a considerable movement of air takes place. It may be summed up that, whatever the cubic space, the air in a confined space occupied by living beings may be assumed to attain a permanent degree of purity, or rather impurity, theoretically dependent upon the rate at which emanations are given out by the breathing and other exhalations

of the occupants, and upon the rate at which fresh air is admitted, and that, therefore, the same supply of air will equally well ventilate any space, but the larger the cubic space the longer it will be before the air in it attains its permanent condition of impurity. Moreover, the larger the cubic space, the more easily will the supply of fresh air be brought in without altering the temperature, and without causing injurious draughts. One of the chief difficulties of ventilation arises from the draughts occasioned thereby. Everyone approves of ventilation in theory, but practically no one likes to perceive any movement of air.

These conditions point to the care which should be exercised in the form of rooms, the position of windows, doors, fireplaces, and other matters. We should study how the currents of air move in a room; what is the effect of the form of room on the circulation of these currents of air; for instance, a lofty room with the tops of windows some distance below the ceiling, and without outlets for air at the ceiling level, becomes dangerous, unless a constant circulation of air goes on, because the heated air, loaded with impurities, ascends, stagnates in the space near the ceiling, cools, and falls down, and re-mixes with the air in the lower part of the room, and thus increases its impurity. These effects are modified by anything which causes circulation of the air. The open fireplace creates circulation of air in a room, with closed doors and windows. The air is drawn along the floor towards the grate; it is then warmed by the heat which pervades all objects near the fire, and part is carried up the chimney with the smoke, whilst the remainder, partly in consequence of the warmth it has acquired from the fire, and partly owing to the impetus created in its movement towards the fire, flows upwards towards the ceiling near the chimney breast. It passes along the ceiling, and, as it cools in its progress towards the opposite wall, descends to the floor, to be again drawn towards the fireplace. Thus, the open fire, whilst continually removing a certain quantity of air from the room, which must be replaced by fresh air, causes an efficient circulation of the air remaining in the room. Moreover, a room warmed by an open fire is pleasanter than a room warmed by hot-water pipes.

A warm body radiates heat to a colder body near to it. The heat rays from a flame or from incandescent matter pass through the air without heating it; they warm the solid bodies upon which they impinge, and these warm the air. Where the source of heat in a room consists of hot-water pipes, or low-pressure steam pipes, the air is first warmed, and imparts its heat to the walls. The air is thus warmer than the walls. When a room is warmed by an open fire, on the other hand, the warming is effected by the radiant heat from the fire, which passes through the air without sensibly warming it; the radiant heat warms the walls and furniture, and these impart their heat to the air. Therefore the walls in this case are warmer than the air. Consequently, in two rooms, one warmed by an open fire, and the other by hot-water pipes, and with air at the same temperature in both rooms, the walls in the room heated by hot-water pipes would be some degrees colder than the air in the room, and therefore colder than the walls of a room heated by an open fire; and these colder walls would therefore abstract heat from the occupants by radiation more rapidly than would be the case in the room heated by an open fire. And to bring the walls in the room heated with hot-water pipes to the same temperature as the walls in the rooms heated by the open fire would require the air of the room to be heated to an amount beyond that necessary for comfort, and therefore to a greater amount than is desirable. Moreover, warmed air contains less oxygen than cooler air, and as sick persons are more sensitive to such influences than persons in health, these may be the reasons why, in hospital wards, the warming by means of an open fire has been always preferred to warming by hot air or hot-water pipes. With complicated buildings, such as theatres, legislative assemblies, prisons, etc., the problems of ventilation are more difficult and intricate, but all are based on the same principles of the movement of air.

Another group of questions relating to sanitary construction are: What are the best materials for the house, and the best distribution of those materials? How can the less pure air from the ground be prevented from entering the house through the basement? What is the effect of the porosity of materials on the health of the inmates of a house? What is the law which regulates the loss of heat through walls and windows, skylights and roofs? For instance, if we assume that the loss of heat through a wall nine inches—*i.e.*, one brick thick, with a temperature inside the room 2° above that outside, would be one unit for a given area of surface of wall, the loss of heat through a wall built of two half bricks, *i.e.*, four inches and a-half, on each side of a central air-space, would be two-thirds of the loss of the solid wall. Similarly the loss of heat through a double window would be about three-fifths of that through a single window. The laws which govern these questions are as complicated as those which govern the strength of materials, or the flow of water, and they form the alphabet of sanitary building. Whilst, however, I have limited myself to speaking of a theoretical knowledge, it is of essential importance that the sanitary architect, builder, or engineer should have also practical technical knowledge of the subject. He should know what constitutes a good material and good workmanship.

One instance of the sanitary importance of the quality of materials will suffice here. Dust and impurities adhere less to glass of a good quality than to glass of a bad quality, because the surface of the latter becomes rough much more rapidly than the surface of glass of good quality.

But there is one branch of work connected with water supply and drainage in which practical knowledge is especially necessary, and which has not been so prominently considered as it should be. I mean the details of the plumber's work, and the work connected with house drains. However well you may design your house drains, the whole of your design may be rendered nugatory by apparently trifling mistakes or carelessness in the details. Your trap may be excellent, but the junction with the pipe may be faulty. It is easy to conceal a bad joint; it is long before the defects in a badly laid drain will become apparent if the drain is buried underground. Therefore, it is not only the officers of the army of sanitary constructors who require knowledge and education, but the foremen and the labourers, each in his own degree.

I have thus specially called attention to these points of sanitary construction, because they are not in general sufficiently dwelt upon; and the popular idea seems often to be that sanitary engineering means drainage and water-supply alone.

I cannot refrain from offering a few remarks upon

water-supply and drainage, which at the present time necessarily fill the public mind.

We derive our whole water-supply from the rainfall. If it falls on an impervious surface, it runs off in rivers above ground; if it falls on a pervious surface, it runs off underground in rivers whose direction of flow will depend on the geological formation. However much our population may grow, we cannot therefore increase our supply; but we may store it and utilise it if we obtain a knowledge of where it falls and where it flows to. It is thus the function of the sanitary engineer to trace the course of these water-supplies. But rain does not fall equally over the whole country. On the contrary, as has been so well shown by Mr. Symons, there is in some localities in England an enormous surplus, and in other localities a bare supply, and the incidence of these supplies has no reference to the spread of population over the country; thus it requires something beyond local organisation to arrange for a distribution of the supply in accordance with the relative wants of the country. It is on these grounds essentially the duty of the Government to take up this question. The Government have taken into their hands the more theoretical question as to when storms may be expected; but they have not taken in hand the question which has an enormously greater practical importance, viz, that of watching over our water-supplies, although it is on the careful use of these that the health of the whole country depends. The first step towards obtaining a clear understanding of the question is to bring all the information on this subject to a focus. At the present time there are certain important public departments, the information collected by which bears materially on the sanitary condition of the country; and yet these departments are scattered about indiscriminately, as if with the intention of preventing the information they already possess, and could so easily add to, from being brought to any useful focus.

The departments to which I allude are—1. The Ordnance Survey, which is under the First Commissioner of Works, probably of all departments of the Government the one least qualified to administer it usefully. The Ordnance Survey was originally undertaken on the one-inch scale for military purposes. The military map has long been complete. A survey was, however, commenced on an enlarged scale many years ago, which affords an admirable map for sanitary purposes. But the progress is so slow, that a large portion of England remains unmapped, except on the old one-inch scale. 2. The Geological Survey, which is under the Privy Council, and whose progress also is very slow. 3. The Registrar-General's department, which is attached to the Local Government Board. 4. The Meteorological Office, which is under the Board of trade.

The first step is to bring these departments under one general head, so that the information they can severally afford may be properly correlated. The Local Government Board would seem to be the department under which they would most naturally fall; and a department should be added for registering the distribution of rainfall over the British Isles on the plan initiated by the enterprise of Mr. Symons.

By means of this machinery the information bearing on the water-supplies of the country, which is in existence, could be easily collected and made available, and the Government and Parliament would then be in a more favourable position for considering the necessity and, if such necessity exists, the means of enabling the districts furnished with a copious water-supply to assist the less favoured districts.

On the question of sewage, it is sufficient to say that this must remain always a problem for the sanitary engineer, because no one system of sewage could be adopted universally; the peculiarities of different localities require different methods of treatment. Where land at a reasonable price can be procured, with favourable natural gradients, with soil of a suitable quality and in a sufficient quantity, a sewage farm, if properly conducted, is apparently the best method of disposing of water-carried sewage.

In the case of towns, where land is not readily obtained at a moderate price, some of the processes, based upon subsidence, precipitation, or filtration, produce a sufficiently purified effluent for discharge, without injurious result, into watercourses and rivers, provided the volume of water into which it is discharged is of sufficient magnitude to effect a considerable dilution. But, as a rule, no profit can be derived at present from sewage utilisation.

With dry systems, where collection at short intervals is properly carried out, the result, as regards health, appears to be satisfactory. For health's sake, without consideration of commercial profit, sewage and excreta must be got rid of at any cost. My object in this *résumé* has been to endeavour to show how extensive is the field of knowledge which has to be traversed by those who undertake the duty of building healthy houses, and of watching over the arrangements for securing the health of towns. The researches of the physiologist and the medical man into the laws which govern the prevalence of diseases, have enabled them by the accumulation of information to lay down the principles upon which healthy construction should rest; it is the duty of the architect, the builder, the engineer, and the surveyor, to apply these principles; and their correct application is as essential to the efficient construction of a dwelling as is the quality or strength of materials which are used.

The acquisition of sanitary knowledge covers a vast area of ground, and requires special study. The universities of Oxford, Cambridge, and London, instituted examination in public health, but with little success; few candidates came forward, and indeed no candidates offered themselves for Oxford and London at the last examination. The reason is obvious. It is, in the first place, not sufficiently understood by the community that the sanitary architect, builder, or engineer requires special knowledge. But if it were understood, there is, at the present time, no place or institution where this knowledge can be acquired. The universities have instituted no chairs of sanitary instruction. It is not taught in schools. But until some means of obtaining the education can be afforded, it is of little avail to establish examinations, or offer to give degrees.

The Sanitary Institute, whose *raison d'être* is to promote sanitary progress, has from the first recognised the importance of developing sanitary education, and has now decided to come forward as its champion. With this object, the Sanitary Institute proposes to organise a course of lectures to be delivered, in the practical branches of this question during the coming winter, and in this effort they are about to make for the public good the Council trust they will receive the support of all those interested in sanitary progress.

There is, however, a further step required in order

to produce throughout the country a due recognition of the importance of sanitary knowledge, and this step should be at once taken. The Medical Officers of Health, who are the advisers of the local authorities on questions connected with public health, have obtained a title to their position in the medical profession by virtue of certificates from qualified Boards of Examiners. But local surveyors, whose duty it is to advise local authorities on matters of sanitary construction, are not required to produce any such certificate of qualification. In many instances, local surveyors, who should be the guides of the people in sanitary matters, do not sufficiently appreciate the subject on which they should advise. If steady and continuous progress is to be made in sanitary construction throughout the country, it is essential that the surveyors should receive a sound education on this special part of their profession. The summary of the conclusions to which I would lead you in this address are, therefore — 1. That endeavours should be made to cause the adoption in educational establishments of courses of systematic education in sanitary science for those who undertake the business of sanitary construction. 2. That no person should be appointed to the office of surveyor of a local board or corporation without a certificate, from some duly qualified educational institution, of proficiency in practical sanitary science.

REMARKS ON CERTAIN POINTS IN THE WORK OF THE ENGINEER

WHICH HAVE A DIRECT BEARING ON PUBLIC HEALTH.*

By Bailey Denton, C.E.

For some years past, I have been strongly impressed with the advantage to be gained from authoritative determination of certain points in sanitary engineering, which would be accepted as conclusive by the country at large. I have been brought to this conclusion from finding that there still prevails a hesitation to adopt what the majority of experienced sanitary engineers and medical authorities consider settled, and that this hesitation is not confined to local boards and local surveyors, but extends to influential persons whose opinions greatly prejudice the permanent character of works.

It can be well understood why the present Local Government Board, as the central authority, should refrain from imposing positive rules to override the judgments of independent engineers and local surveyors, for the experience gained since the Public Health Act of 1848 has brought home to all engineers alike the fact that the dicta then pronounced as fixed have led to conflicting results, and have deterred people from accepting as final certain principles and views which the experience gained since 1848 would long ago have established.

There are many points, indeed, upon which it is most desirable for the nation at large that this hesitation should cease to exist, and I will select a few illustrations—very different but equally important in character—to prove this statement, hoping that a means will be found of establishing some body in the shape of a council or commission, composed of the highest authorities that can be brought together, who shall conclusively decide them. I will place these few illustrations before you in the shape of questions, beginning with one of a fundamental nature, and at the same time state my own views, in the hope of eliciting discussion.

The questions will be as follows :

I. What are the sanitary objects which should be comprised in the duties of a River Conservancy Board?

II. Should surface-waters be excluded from sewers?

III. Should the public sewers of urban and rural districts be perfectly ventilated?

IV. Should all sewers be made water-tight?

I. The Rivers Conservancy Bill of last session had for its declared object (see sections 9 and 10) the conservancy of rivers and watercourses, and the prevention or mitigation of floods, with powers to enforce the Rivers Pollution Prevention Act, 1876. But although the conservancy boards to be created under the Act were to be bound to make periodical surveys of the watercourses within their district (see section 17), the Bill, when it left the House of Lords, contained no provision for securing a supply of water to the inhabitants of the river basins dealt with by the preservation of these watercouses in a pure condition, or by the storage of unpolluted surface-waters in substitution thereof, or by the raising from the water-bearing strata beneath, an equal quantity of the purest water.

The Bill excluded from its operations the two rivers, Thames and Lee, which are at present controlled by separate conservancy boards, and as the proceedings of these somewhat important bodies may guide future boards, I will endeavour to point out how the desiderata of river pollution and water supply are at this time being dealt with by them.

Since the first Act of 1857 constituted the Thames Conservancy Board, the length of river under the jurisdiction of the Board has been ext nded (by the Act of 1866) from Staines to Cricklade, while the breadth of area which was first confined (by the Act of 1857) to the width of the river itself, has been gradually increased to three miles on each side of the river by the Act of 1867; then to five miles by the Act of 1870; and, lastly, by that of 1878 to ten miles on each side of the river, making twenty miles by adding the two sides together. Reducing this present breadth of district to superficial area, it will be found that the control of the Board above the intakes of the Water Companies extends to a trifle above three-fourths of the tributary basin, leaving rather less than one-fourth—comprising about half a million acres—over which no conservancy jurisdiction exists, and from which the conservators have to submit to the influx of any polluting matter which may imperceptibly find its way into the river system. I say imperceptibly, because any defilement which was distinctly apparent would probably be met by independent action.

The work of the Thames Conservancy Board has decidedly been very considerable, and great improvement in the condition of the river has resulted from its supervision, but so long as there exists beyond control within the watershed such a wide margin as 800 square miles, you will agree with me that the duty expected of a Conservancy Board cannot be perfectly performed, and that this is the right conclusion is to be inferred from the fact that the Legislature itself, by five different Acts of Parliament, has gradually lengthened and widened the area of control in the manner I have stated.

The river Lee, which supplies two of the largest Water Companies furnishing London with water is

* Read at the Sanitary Congress at Croydon, Oct. 1879.

not subject to the same restrictions as that which prevails in the Thames basin. By the Lee Conservancy Act, 1868, which declares the duties of the Board to be the preservation of the purity of the water of the Lee and its tributaries, as well as the improvement of the stream and the maintenance of navigation works the tributaries over which jurisdiction is given are particularised without any reference to the minor streams and watercourses which feed those tributaries, and the consequence is that the control of the Board is considerably limited. If this is not the case by the legal interpretation of the Act, it certainly is so in a practical sense.

Upon this point I can speak positively, because I live within the watershed of the Lee, and the village in which I reside has a population of about 2,500 persons, which at this moment is discharging its sewage into a branch of one of the tributaries specified in the Act. This sewage, when it reaches the Lee as reach it it must is necessarily mixed with the water consumed by the inhabitants of London.

Other villages of less populations do the like, and the Lee Conservators evidently consider it no part of their duty to prevent such pollution. It will therefore remain until some authority, having jurisdiction over the whole watershed, compels all sanitary authorities of districts within it to free their liquid refuse of foul and noxious matters.

Although the Local Board (Stevenage) to which I particularly refer was called into existence five years ago, it is the fact that up to this moment it has utterly disregarded the pressure of the Local Government Board, under a belief that, however peremptory the tone of communication may be, nothing will really be done by that Board to enforce compliance. The prospect of a writ of mandamus is held in perfect ridicule, and only those inhabitants are elected on the Board who will do nothing of a comprehensive character.

While this pollution of the stream is permitted, its waters still continue to be used for domestic and agricultural purposes by the people who live on its banks below. At the same time, the inhabitants of the village committing the wrong derive their own water-supply from wells of various depths, which are fed by percolation from the surface, although there exists immediately under their feet, at a depth of about 100 ft., the pure and never-failing supply of the great chalk basin. The consequence is, that while the Local Board by inaction are rendering the water of the stream into which the sewage of the district is discharged unfit for use by man and beast, the inhabitants live constantly liable to endemic maladies whenever dry seasons recur.

This homely illustration of the want of some presiding local authority is only one of many that I could quote as existing in the same watershed, but I hope it will suffice to show that any control by Conservancy Boards that does not extend from the main trunk and its tributaries up to the extreme margin of the river basin, and does not turn to use the subterranean sources of supply by the exercise of powers such as were embodied in the 20th section of the Rivers Conservancy Bill of which I have spoken, must fail to secure the sanitary benefit the country should demand. The section I refer to (the 20th) empowers a Conservancy Board to charge upon a part of a watershed a private improvement rate to discharge any special duties which may be authorised by the Act, and surely, as their duties extend to the preservation of the purity of water, the provision of water to villages should be one branch of duty. To tax the upland portions of a river basin (as intended by 5th section of the Bill) towards the cost of improving main outfalls, on the ground that they throw down their surplus waters to flood the valleys—a charge which is perfectly right in itself—must strike everyone as unjust if the provision of pure water to the taxed population fail to receive from the Controlling Board the consideration due to so vital a question.

The use as well as abuse of waters feeding our rivers are objects so important to the nation that I trust you will be able to answer the question I have put to you by declaring that the duties of a Conservancy Board should extend beyond the bed and banks of a river, and the maintenance of navigation works, to the protection from pollution, as far as practicable, of every stream and watercourse within the watershed area, and to the substitution of either stored or subterranean supplies, where the purity of the running streams cannot be assured.

II. The next two questions have a somewhat intimate bearing upon each other, as one relates to the admission of surface-waters into the sewers, and the other to the ventilation of sewers.

The two objects may be considered to be related to each other; because, although all engineers know that the air existing in sewers is more or less affected by every fluctuation of the flow of liquid within them, we have ample reason for believing that, in many cases where unsatisfactory sanitary results have followed the adoption of systematic sewerage, they have been due to the want of the proper ventilation of the sewers, and in no small degree to the escape of sewer air into dwellings when forced out of them by the recurring influx of surface-waters, to say nothing of the escape of diluted sewage into the basements of houses, and into the ground adjacent to the sewers, which too frequently occurs when the sewers are overcharged.

When systematic sewerage was first adopted, under the Public Health Act, 1848, there existed no law compelling the Local Authorities to free the discharged liquid of foul and noxious matter. The rivers were then still recognised as the proper recipients of liquid refuse, and whether it consisted of the water consumed by the population, and converted into sewage, or the rainfall thrown off the surface, it made no difference. The admission of surface-waters into sewers was therefore encouraged; first, because it was the readiest means of getting rid of a troublesome matter; and next, because the rain was thought to be the readiest means of flushing out the sewers. To make the sewers large enough to receive and discharge surface-waters as well as sewage, was represented as cheaper than the separation of the two; and so long as the rivers remained legally the proper recipients of foul as well as clean water, this treatment obtained general concurrence.

The obligation subsequently imposed upon all Local Authorities to free the refuse liquid they discharge into rivers from all foul and noxious matter has entirely upset this convenient arrangement, and we now find that on all grounds the separation of rainfall from sewage as far as practicable, is desirable on sanitary as well as economical grounds.

Of course, there will always exist flaws in both masons and plumbers work, however vigilant the supervision of local surveyors may be, and faulty traps will be found to admit sewer-air into dwellings and leaky sewers to let out liquid into the ground without any extra pressure, caused by the influx of surface-waters; but every day's experience is proving, to those observant of facts, that on occasions of

heavy rainfall, not only will sewer-gas find ingress into dwellings through faulty traps, but it will make a passage for itself, through water-traps, into kitchens and sculleries, even though they be in ordinary working condition. It not unfrequently happens, too, that upon extreme occasions, sewage diluted with storm-water will rise up the private sewers into the cellars and basements of houses; and I have seen instances where the deposit of sewer sludge in cellars has been considerable, and the effluvium arising from it most objectionable. All outlet pipes from sinks, etc., ought to be disconnected from the sewer, and then these evils cannot arise.

In the disposal of sewage, the advantage of separation is incontrovertible. This was made very clear in 1868, by the late Mr. William Menzies, and has since been forcibly shown to be the case, by Colonel Jones, as well as several other authorities on sewage utilisation. As a sewage farmer, having to deal with different characters of soil, more or less absorbent, I can speak feelingly upon the immense difficulty of dealing with sudden augmentations of quantity.

But it matters not whether sewage is utilised upon land, or its solid ingredients precipitated by chemical processes, the sudden and copious increase of quantity, and the equally sudden and great variation in quality, will always convert the best designed arrangement into a work of disorder.

If, in addition to these drawbacks, the sewage has to be raised to the place of disposal, it is needless to say that every gallon of surface-water by which it is diluted, adds proportionately to the cost of pumping.

The only objection that in any way holds good is that the sudden admission of the rainfall into the sewers is an automatic mode of flushing them, and relieving them of deposit. But when it is remembered that surface-waters invariably bring with them road detritus, it will be granted that in the majority of cases the sewers are more likely to gain deposit than be freed from it by the admission.

Without going into any details to show that methodical flushing is superior to the occasional clearing of sewers by the rainfall, I am content to state, that with properly devised penstocks and valves, engineers may effect a perfect means of flushing sewers of deposit without the aid of the rainfall; though, in saying this, I would not reject the partial use of surface-waters, when they can favourably be brought to bear.

III. The ventilation of the public sewers of a district is the next object upon which I desire to express my opinions.

Engineers are constantly meeting with objections from the local boards they serve, from inhabitants of sewered towns, and not unfrequently from medical men, to the existence of ventilators, *i.e.*, the manholes and lampholes with gratings acting as such, when placed in the streets and other thoroughfares; and a medical journal, of high standing, recently pointed out that invalids, and persons of weak constitutions may inhale effluvia coming up from these outlets with very injurious results. These objections often assume, too, a substantial form by the outlets themselves being stopped up. We shall all admit that a disagreeable stench meeting us as we pass a ventilator in the street is not an agreeable thing, and we may readily conceive that a person sensitive from sickness might suffer from such cause; but, inasmuch as gases generated in sewers must escape somewhere, there can be no doubt but that it is far better that they should do so in the public streets and in the open air, rather than in private houses and confined spaces, from which there is no escape.

The problem to be solved is, how to effect such a system of ventilation as shall prevent the escape of objectionable stenches, either into the streets or into houses. Tall shafts, erected in selected places, have been tried, and are found incapable of effecting that concentration of foul air that was expected of them, while all attempts to purify gases rising up from street ventilation by the interposition of trays of charcoal or any other material, have been found equally ineffective.

But the difficulties we experience are, nevertheless, to be overcome; not by adopting extraordinary scientific expedients, nor by reducing the number of outlets or stopping up those that exist, but by increasing their number, and by insisting upon the ventilation of the soil-pipes of water-closets connected with the sewers, and all receptacles of putrescible matter into which sink-pipes, etc., may discharge, by sufficiently large pipes carried directly up above the roof of houses.

Experience on all hands points to the advantage of diffusing the air of sewers by frequent ventilation at different elevations. This alone secures perfection. I therefore submit that a positive understanding should be come to, which should have the force of law.

IV. The next and last question I have to submit is, 'should all sewers be made watertight'? Upon this point it is quite as necessary for the public advantage that a positive rule should be laid down, as it is to come to a final decision on those objects which I have already put before you.

Although, as an abstract question, there can be no doubt that sewers should only discharge the foul liquid they collect, it cannot be denied that, in certain instances, sewers which have acted as drains, in consequence of their not having been constructed in a water-tight condition, have produced such a good effect upon the health of the district they have traversed, by reducing the water-level in the ground, that a conflict of opinion has arisen, and to some extent still prevails, as to the desirability of having conduits, which shall perform the two services of sewerage and drainage at the same time. The adoption of what has been termed 'drain-sewers', however, in the cases I have referred to, was not the result of deliberate design, but was due to the absence of a recognition of the actual difference between a drain and a sewer, the duty of the former being to drain water out of the ground, while that of the latter is simply to discharge, as I have said, the filthy liquid it is intended to collect. These 'drain-sewers' were, in fact, constructed with a disregard of the truth, that the same apertures which admit water into the sewer from the surrounding ground, under one condition of things, will let the filthy liquid out of the sewers into the same ground, to make it excrement-sodden under another condition of things.

If the effect of making a sewer act as a drain was simply to lower the water level in the soil, and secure the benefit which, in a sanitary view, invariably follows the lowering of the subsoil water in a populous town, nothing could be more desirable. But the consequence of doing so may not only be what I have just pointed out, but it will certainly be to dilute the sewage to such an extent as to increase its volume beyond the limits of economical treatment.

Within certain limits this dilution acts beneficially in keeping the sewers clean, but where, as in Liverpool, London, Dover, Leicester, and Torquay, the

not subject to the same restrictions as that which prevails in the Thames basin. By the Lee Conservancy Act, 1868,—which declares the duties of the Board to be the preservation of the purity of the water of the Lee and its tributaries, as well as the improvement of the stream and the maintenance of navigation works—the tributaries over which jurisdiction is given are particularised without any reference to the minor streams and watercourses which feed those tributaries, and the consequence is that the control of the Board is considerably limited. If this is not the case by the legal interpretation of the Act, it certainly is so in a practical sense.

Upon this point I can speak positively, because I live within the watershed of the Lee, and the village in which I reside has a population of about 2,500 persons, which at this moment is discharging its sewage into a branch of one of the tributaries specified in the Act. This sewage, when it reaches the Lee—as reach it it must—is necessarily mixed with the water consumed by the inhabitants of London.

Other villages of less populations do the like, and the Lee Conservators evidently consider it no part of their duty to prevent such pollution. It will therefore remain until some authority, having jurisdiction over the whole watershed, compels all sanitary authorities of districts within it to free their liquid refuse of foul and noxious matters.

Although the Local Board (Stevenage) to which I particularly refer was called into existence five years ago, it is the fact that up to this moment it has utterly disregarded the pressure of the Local Government Board, under a belief that, however peremptory the tone of communication may be, nothing will really be done by that Board to enforce compliance. The prospect of a writ of mandamus is held in perfect ridicule, and only those inhabitants are elected on the Board who will do nothing of a comprehensive character.

While this pollution of the stream is permitted, its waters still continue to be used for domestic and agricultural purposes by the people who live on its banks below. At the same time, the inhabitants of the village committing the wrong derive their own water-supply from wells of various depths, which are fed by percolation from the surface, although there exists immediately under their feet, at a depth of about 100 ft., the pure and never-failing supply of the great chalk basin. The consequence is, that while the Local Board by inaction are rendering the water of the stream into which the sewage of the district is discharged unfit for use by man and beast, the inhabitants live constantly liable to endemic maladies whenever dry seasons recur.

This homely illustration of the want of some presiding local authority is only one of many that I could quote as existing in the same watershed, but I hope it will suffice to show that any control by Conservancy Boards that does not extend from the main trunk and its tributaries up to the extreme margin of the river basin, and does not turn to use the subterranean sources of supply by the exercise of powers such as were embodied in the 26th section of the Rivers Conservancy Bill of which I have spoken, must fail to secure the sanitary benefit the country should demand. The section I refer to (the 26th) empowers a Conservancy Board to charge upon a part of a watershed—a private improvement rate to discharge any special outlay which may be authorised by the Act, and surely, as their duties extend to the preservation of the purity of water, the provision of water to villages should be one branch of duty. To tax the upland portions of a river basin (as intended by 5th section of the Bill) towards the cost of improving main outfalls, on the ground that they throw down their surplus waters to flood the valleys—a charge which is perfectly right in itself—must strike everyone as unjust if the provision of pure water to the taxed population fail to receive from the Controlling Board the consideration due to so vital a question.

The use as well as abuse of waters feeding our rivers are objects so important to the nation that I trust you will be able to answer the question I have put to you by declaring that the duties of a Conservancy Board should extend beyond the bed and banks of a river, and the maintenance of navigation works, to the protection from pollution, as far as practicable, of every stream and watercourse within the watershed area, and to the substitution of either stored or subterranean supplies, where the purity of the running streams cannot be assured.

II. The next two questions have a somewhat intimate bearing upon each other, as one relates to the admission of surface-waters into the sewers, and the other to the ventilation of sewers.

The two objects may be considered to be related to each other; because, although all engineers know that the air existing in sewers is more or less affected by every fluctuation of the flow of liquid within them, we have ample reason for believing that, in many cases where unsatisfactory sanitary results have followed the adoption of systematic sewerage, they have been due to the want of the proper ventilation of the sewers, and in no small degree to the escape of sewer air into dwellings when forced out of them by the recurring influx of surface-waters, to say nothing of the escape of diluted sewage into the basements of houses, and into the ground adjacent to the sewers, which too frequently occurs when the sewers are overcharged.

When systematic sewerage was first adopted, under the Public Health Act, 1848, there existed no law compelling the Local Authorities to free the discharged liquid of foul and noxious matter. The rivers were then still recognised as the proper recipients of liquid refuse, and whether it consisted of the water consumed by the population, and converted into sewage, or the rainfall thrown off the surface, it made no difference. The admission of surface-waters into sewers was therefore encouraged; first, because it was the readiest means of getting rid of a troublesome matter; and next, because the rain was thought to be the readiest means of flushing out the sewers. To make the sewers large enough to receive and discharge surface-waters as well as sewage, was represented as cheaper than the separation of the two; and so long as the rivers remained legally the proper recipients of foul as well as clean water, this treatment obtained general concurrence.

The obligation subsequently imposed upon all Local Authorities to free the refuse liquid they discharge into rivers from all foul and noxious matter has entirely upset this convenient arrangement, and we now find that, on all grounds, the separation of rainfall from sewage (as far as practicable) is desirable on sanitary as well as economical grounds.

Of course, there will always exist flaws in both masons' and plumbers' work, however vigilant the supervision of local surveyors may be, and faulty traps will be found to admit sewer-air into dwellings and leaky sewers to let out liquid into the ground without any extra pressure, caused by the influx of surface-waters; but every day's experience is proving, to those observant of facts, that on occasions of

heavy rainfall, not only will sewer-gas find ingress into dwellings through faulty traps, but it will make a passage for itself, through water-traps, into kitchens and sculleries, even though they be in ordinary working condition. It not unfrequently happens, too, that upon extreme occasions, sewage diluted with storm-water will rise up the private sewers into the cellars and basements of houses; and I have seen instances where the deposit of sewer sludge in cellars has been considerable, and the effluvium arising from it most objectionable. All outlet pipes from sinks, etc., ought to be disconnected from the sewer, and then these evils cannot arise.

In the disposal of sewage, the advantage of separation is incontrovertible. This was made very clear in 1868, by the late Mr. William Menzies, and has since been forcibly shown to be the case, by Colonel Jones, as well as several other authorities on sewage utilisation. As a sewage farmer, having to deal with different characters of soil, more or less absorbent, I can speak feelingly upon the immense difficulty of dealing with sudden augmentations of quantity.

But it matters not whether sewage is utilised upon land, or its solid ingredients precipitated by chemical processes, the sudden and copious increase of quantity, and the equally sudden and great variation in quality, will always convert the best designed arrangement into a work of disorder.

If, in addition to these drawbacks, the sewage has to be raised to the place of disposal, it is needless to say that every gallon of surface-water by which it is diluted, adds proportionately to the cost of pumping.

The only objection that in any way holds good is that the sudden admission of the rainfall into the sewers is an automatic mode of flushing them, and relieving them of deposit. But when it is remembered that surface-waters invariably bring with them road detritus, it will be granted that in the majority of cases the sewers are more likely to gain deposit than be freed from it by the admission.

Without going into any details to show that methodical flushing is superior to the occasional clearing of sewers by the rainfall, I am content to state, that with properly devised penstocks and valves, engineers may effect a perfect means of flushing sewers of deposit without the aid of the rainfall; though, in saying this, I would not reject the partial use of surface-waters, when they can favourably be brought to bear.

III. The ventilation of the public sewers of a district is the next object upon which I desire to express my opinions.

Engineers are constantly meeting with objections from the local boards they serve, from inhabitants of sewered towns, and not unfrequently from medical men, to the existence of ventilators, *i.e.*, the manholes and lampholes with gratings acting as such, when placed in the streets and other thoroughfares; and a medical journal, of high standing, recently pointed out that invalids, and persons of weak constitutions may inhale effluvia coming up from these outlets with very injurious results. These objections often assume, too, a substantial form by the outlets themselves being stopped up. We shall all admit that a disagreeable stench meeting us as we pass a ventilator in the street is not an agreeable thing, and we may readily conceive that a person sensitive from sickness might suffer from such cause; but, inasmuch as gases generated in sewers must escape somewhere, there can be no doubt but that it is far better that they should do so in the public streets and in the open air, rather than in private houses and confined spaces, from which there is no escape.

The problem to be solved is, how to effect such a system of ventilation as shall prevent the escape of objectionable stenches, either into the streets or into houses. Tall shafts, erected in selected places, have been tried, and are found incapable of effecting that concentration of foul air that was expected of them, while all attempts to purify gases rising up from street ventilation by the interposition of trays of charcoal or any other material, have been found equally ineffective.

But the difficulties we experience are, nevertheless, to be overcome; not by adopting extraordinary scientific expedients, nor by reducing the number of outlets or stopping up those that exist, but by increasing their number, and by insisting upon the ventilation of the soil-pipes of water-closets connected with the sewers, and all receptacles of putrescible matter into which sink-pipes, etc., may discharge, by sufficiently large pipes carried directly up above the roof of houses.

Experience on all hands points to the advantage of diffusing the air of sewers by frequent ventilation at different elevations. This alone secures perfection. I therefore submit that a positive understanding should be come to, which should have the force of law.

IV. The next and last question I have to submit is, 'should all sewers be made watertight'? Upon this point it is quite as necessary for the public advantage that a positive rule should be laid down, as it is to come to a final decision on those objects which I have already put before you.

Although, as an abstract question, there can be no doubt that sewers should only discharge the foul liquid they collect, it cannot be denied that, in certain instances, sewers which have acted as drains, in consequence of their not having been constructed in a water-tight condition, have produced such a good effect upon the health of the district they have traversed, by reducing the water-level in the ground, that a conflict of opinion has arisen, and to some extent still prevails, as to the desirability of having conduits, which shall perform the two services of sewerage and drainage at the same time. The adoption of what has been termed 'drain-sewers', however, in the cases I have referred to, was not the result of deliberate design, but was due to the absence of a recognition of the actual difference between a drain and a sewer, the duty of the former being to drain water out of the ground, while that of the latter is simply to discharge, as I have said, the filthy liquid it is intended to collect. These 'drain-sewers' were, in fact, constructed with a disregard of the truth, that the same apertures which admit water into the sewer from the surrounding ground, under one condition of things, will let the filthy liquid out of the sewers into the same ground, to make it excrement-sodden under another condition of things.

If the effect of making a sewer act as a drain was simply to lower the water level in the soil, and secure the benefit which, in a sanitary view, invariably follows the lowering of the subsoil water in a populous town, nothing could be more desirable. But the consequence of doing so may not only be what I have just pointed out, but it will certainly be to dilute the sewage to such an extent as to increase its volume beyond the limits of economical treatment.

Within certain limits this dilution acts beneficially in keeping the sewers clean, but where, as in Liverpool, London, Dover, Leicester, and Torquay, the

constant outflow from the sewers is more than doubled by the influx of subsoil water, the difficulties of disposing of sewage is very greatly increased.

The difference between the admission of subsoil-water and surface-waters is, that the former increases the outflow, and the cost of treating that outflow constantly, while the effect of the latter is only occasional. In the first case, the whole of the outflow, however much it may be diluted, must be freed of foul and noxious matter; whereas, in the last case, relief may fairly be afforded by storm overflows, in times of heavy rainfall, when the rivers themselves are in a flooded and disturbed condition. Two evils, therefore, attend the use of sewers as drains, which may be avoided by making them water-tight.

I am led to submit this point for public consideration, because it is not an unfrequent practice, in certain localities, to use clay for the jointing of sewer-pipes, under the plea of economy. In some parts of the north of England, clay is more frequently used than any other material; and I have good reason for knowing that, although, in certain instances, that practice may be adopted without much disadvantage, in the majority of cases it entirely fails, both in keeping the subsoil-water out of the sewer, and the 'sewage proper' in the sewer. So difficult is it in the first place to prepare clay suitable for the purpose, in the next to get it placed equally within the socket, and afterwards to retain the jointing in its position, under pressure from without, when the soil is full of water, and under pressure from within when the sewer is overcharged with the rainfall, that I do not hesitate to say, after more than thirty years' continuous practice in the treatment of clay, that no amount of vigilance in supervision can render clay a perfect material for the jointing of sewers of any considerable length. I have, on several occasions, found that after a time the clay has been entirely washed from the joint.

With the facility that always exists of placing a subsoil open drain under a water-tight sewer, to keep the subsoil-water well below it during its construction, as well as to serve for a discharge of that water for all future time, it is hard to find a reason for uniting the two works in one.

The practice which now finds favour with our leading engineers, of jointing sewer-pipes with tarred hemp, or gaskin and portland cement, and having an independent drain beneath, with a layer of concrete between them, to support the sewer where it is of large dimensions, seems to leave nothing to be desired. I therefore submit that all sewers should be water-tight.

Believing that the Government will not take upon itself to determine such questions as I have put before you, I would ask, is it not desirable that some seven or nine selected men should, with the approval of Parliament, form a Sanitary Council or Commission, somewhat of the character of the railway commission, who should consider and express a positive decision, when unanimous, upon all such points as may be deemed of national importance, so that Local Authorities may be assured that they are proceeding safely in the works they are required to execute?

The Mercers' Company has voted a contribution of ten guineas to the funds of Mrs. Hilton's Crèche, Infant Home and Infirmary, in Stepney Causeway.

Dr. W. W. Stainthorpe has been elected Medical Officer of Health for the rural sanitary district of Swanage, at a salary of £100 a year, and with liberty to carry on private practice.

NORMA OF SANITATION IN THE SCHOOL STAGES OF LIFE,

CHIEFLY ON THE HALF-TIME PRINCIPLE OF MIXED PHYSICAL AND MENTAL TRAINING, AS DISPLAYED AT THE NORTH SURREY DISTRICT ORPHANAGE INSTITUTION AT ANERLY.*

By Edwin Chadwick, C.B.

At our last Continental Sanitary Congress, held at Brussels, it was agreed that the best immediate direction of the efforts of sanitarians will be for the reduction of infantile mortality; because the evils of unsanitary conditions are the most severe with children; because with them those evils are to a very great extent removable by administration rather than with works; and because those evils may be the most readily acted upon, especially in the school stages of infantile life; and because the strongest popular sympathy may be evoked to aid our efforts—for men and women of the lowest class, when they understand the matter, will aid in doing for children what they are heedless in doing for themselves. We have to deal with conditions in populous districts, in which half of all who are born are dead within their fifth year. In London, which, by those who have yet to be largely instructed as to sanitary power and principle, is boasted of as the healthiest city in the world, there are districts where about half of all born of the lower class are in their graves by their sixth year. On an examination, a few years since, it appeared that the excess of deaths in the school stages of life throughout England and Wales amounted to upwards of 50,000 annually. Now we have to deal specially with the causes of such excess. The common conditions of epidemic in the school stages of life are those in which children with filthy skins and filthy clothes are massed together and kept together in sedentary constraint during long hours. This institution supplies a normal example, happily with others, of the results generally obtainable by the removal of these conditions. This may be elucidated by reference to past conditions, and the progressive application of principles with the elaboration of which I have had much to do.

Immediately after the formation of the first Poor-Law Board, there fell to our direct control three large establishments for the maintenance of children by contractors for parishes too small to maintain, without disproportionate expense, establishments of their own. In two of them we were confronted with the task of dealing with frightful epidemics. There were as many as one-third of the children down with fever at one time, and a dreadful mortality, which properly excited great public attention. One of them (Mr. Aubin's establishment at Norwood) might be said to be, from the benefits derived from its subsequent treatment, the predecessor of such separate establishments as the present. He at once frankly offered to carry out implicitly all the instructions he received; and he eventually derived great benefit from his practice in doing so. The general opinion of scientists of curative science was that the children must have been insufficiently fed, and an augmented dietary was the sole preventive that was recommended to us from that source, and that was in accordance with popular opinion. We sent Dr. Neill Arnott, who had some preceptions of rudimentary sanitary science, and he reported that the great cause was foul air, from the conditions in which the children

---

* Read at the Anerly Schools.

were massed together; and an improved ventilation was the main remedy he prescribed, which was adopted. Then there followed the improved air cleanliness, skin cleanliness by head to foot ablutions, not with cold but with tepid water; and, further, by clothes cleanliness. As to clothes cleanliness, Mr. Aubin being questioned as to whether clean pinafores every day for the girls was not a luxury, answered, that in a family a soiled pinafore or two might not be of any moment, but several hundred soiled pinafores brought together made an appreciable difference in the purity of the atmosphere, which was to be taken into account. I must here claim credit for the introduction of the half school-time principle, which I had got introduced into the Factory Acts, by which all the evils common to the long-time schools are reduced by more than the time, which is one half. The prominent evils in those schools are enervation, by the reduction of the natural amount of bodily exercise, and inaptitude for manual labour; distorted spines with girls, injured eyes and near-sightedness, and aggravation of congenital weaknesses. The common evils of long-time detention in the common schools, though they would be largely reduced by the several sanitary factors conducive to air cleanliness, ventilation, skin cleanliness, and clothes cleanliness, yet if even these children were a long time massed together in the open air, they would still be subjected to some aerial impurity from their own atmosphere, and to the evils of excessive bodily complaint. The saving of time from excessive sedentary desk-work enabled the introduction of physical exercises, of which the military drill and naval exercises were the most convenient. These exercises have been supplemented and relieved by various exercises for boys, by swimming, by manual industrial occupations; and appropriate exercises have been provided, with agreeable variations, for girls and also for infants—such as it is the chief object of this visit to display to the members of the Congress. One arrangement to be observed, in passing over the building, is that a separate bed is provided for each child, instead of putting two in a bed as is the common practice. Important sanitary results have been obtained by this arrangement. The results of the progressive application of the sanitary factors—air cleanliness, skin cleanliness, varied sedentary constraint, and increased and improved varied bodily exercises, improved dormitory accommodation, and improved dietaries—have been a gradual reduction of the sickness and death-rates. It was a few years ago reduced to about one-half the sickness and death-rates prevalent amongst the children of the school ages of the general population of every class and degree included in the Registrar-General's returns, that is to say, with children of the lowest type, a large proportion of whom are brought in with congenital defects and disease upon them. In this institution, taking the mean of the first five years since 1871, and the last five years, the mean death-rate for the first five years was 5.8 only; and the mean of the last five years, the years which include, with other improvements, greater care in probationary wards, the mean death-rate has only been 3.4 per 1,000, little more than 3 per 1,000. To give an idea of the point attained in this norma of sanitation, I may mention that a gentleman who had visited a number of boarded-out children stated it as what he considered to be a most conclusive and satisfactory fact, that the death-rate amongst them very little exceeded 2 per cent., that is to say, did not exceed 20 per 1,000, for what must be presumed to be to some extent selected children lodged in selected cottages! The mean of the cases of sickness in the infirmary of the institution for the first five years was 180 per 1,000, and for the last five years only 43.8 per 1,000, or little more than 4 per cent., which includes very slight cases indeed, such as would pass with little regard in the common schools. I have had normal instances of sanitation in institutions for children of a superior type where even better results than these have been obtained.

I can only advert shortly to one great topic, of the moral progress which accompanies correct sanitary and physical progress. It has yet to be understood how much of disorder, of rebellion, of moral depravity, and of crime has its root in physical disorder and depravity. An instance of the disorder arising from physical causes in the common training of children, may be presented from an instance of an interruption of progress in this institution. From such ignorance of principle as is common amongst those bodies to whom the working of scientific factors is confided, without aid or correction, a former managing committee agreed that the military drill—the chief available mode of physical training—was unnecessary, and they dismissed the drill-master. The immediate result of the deficiency of bodily exercise was bodily irritability, and thence uncontrollable mental irritability on the part of the boys; there were tumults and bolstering in the dormitories, breaking of windows, chamber utensils, and all sorts of riot and disorder ensued. In less than a fortnight, as was stated to me, damage was done to the amount of more than £200—more than three years' salary of the drill-master. The chaplain exhorted and prayed; the masters flogged, and flogged, and flogged; but without effect, as it did not touch the seat of the depravity—the irritation from the deficiency of physical exercise. At last, the chaplain and the manager besought the restoration of the drill-master, and the physical exercise he directed. This was done. There was satiety of the demands of physiology, there was quiet sleep in the dormitories, and so it has gone on. Now, wheresoever we hear of any disorder and rebellion in schools, wheresoever there has been extensive truancy, we may be sure that it is the system or the managers that are in the wrong. At this institution, at the beginning, there was frequent truancy, but as improvement proceeded, chiefly in the reduction of excessive sedentary constraint and the improvements in the physical and other exercises, truancy has diminished.

The half-school-time principle of instruction, which when properly conducted involves simultaneous class-teaching, is to be credited with a large reduction of school irritation, even during the reduced school time. In the common national and other schools, the single master has at least six classes in as many distinct conditions to deal with, and he can only give effectual tuition to one class at a time. Meanwhile, the others are kept waiting in a state of constraint and irritability. Go into one of the schools, and you soon hear the master's denunciations of disorder, and 'namings' and threatenings to keep quiet. In a properly organised half-time school, with simultaneous class-teaching, in which each class has its separate teacher, who attends to that class and no other, the child has no waiting, has no time to think of anything but of the work before him, from the time he enters till the time he leaves the school. By this continuous direct teaching his powers of mental receptivity are exhausted, in less time than the reduced hours, though with an increased interest in

the work—if the teaching be good. It is due, however, to sanitation to state, that the half-time teaching being much the same, the later sanitary improvements were attended by a reduction of the sickness and death-rates; as the manager states that now 'a striking moral aspect has presented itself in connection with our sanitary improvements; the children are far better in temper and disposition than they used to be'. Now, what are the moral and economical results of this mixed mental and physical training on the half-time principle? Formerly, in the times of parochial administration, there were scarcely one out of three found in self-supporting occupations. They were found in large proportions amongst the prison populations. Now the children of these institutions are found there in such proportions no longer: and strictly, they are not found there at all. Allowance being made for cases of irretrievably bad bodily and mental conditions approaching to idiotcy, all but a small proportion are found in good places of self-supporting industry. With them hereditary pauperism, mendicity, and criminality are extinguished. But what is the cost of this teaching and training power; with the schoolmasters' results of the series of the gradation of school teachers, the drill-masters, and the bodily trainers? As to the scholastic results, the gain is in years of life, as well as in hours of days, made available for productive industry. Including the infant-school teaching, the children on the half-time system attain, by the tenth or eleventh year, results as good, or better, than are attained in the common national or voluntary, or long-time Board-schools two years later, at a cost of less than one pound per head per annum of the children taught, or less than one-half the cost of the London School Board. The general result of the combined mental and bodily training on the half-school-time principle is to give to two of such children the efficiency of three for productive occupations.

To conclude for this occasion. It has been accepted as a general proposition, that disease is generated by massing large numbers together; that is to say, in ordinary conditions, and in those conditions the proposition is doubtless true. But the working of this institution, with others, on the half-time principle, with the light of Sanitary Science, 'massing numbers together' is proved to be great preventive of epidemics, and of reducing sickness and mortality to the lowest point of which we have known examples. In education it is held that 'massing children together in large numbers' is detrimental to them morally; and that teaching—meaning popular elementary teaching—in small schools is the best. And this is commonly so where large numbers are massed together, and kept together during long hours of sedentary constraint, in violation of the laws of physiology, under exactions of mental tasks beyond the children's powers of mental receptivity. But where the half-time principle is properly understood and applied, as it has been in this institution, with simultaneous class-teaching, the highest results are produced in morals and intelligence for productive occupation, as tested by the outcome.

Mr. Matthew Arnold has recently held forth the system of elementary education in France, which, he says, is conducted at half the cost incurred in England, and with as good results. 'As good results,' that may be, when two-thirds of the population of the prisons, and of the population who occupy the police and the courts of justice, can read and write, —many very well—are of the outcome of that same system.

The half-time system has been studied by the Confrères of the Institut of France, who have approved of it. I got Mons. Jules Simon to visit one of these half-time institutions. I understood him, that on principle it has his approval. M. Wallowski wrote a paper in favour of it. I know from other educationists of France that they have nothing similar or so effective, and I understand that it is now under high consideration for adoption as overcoming much of the difficulty of extending education in France.

I solicited the Archbishop of Canterbury to visit the Institution and examine it for himself. He did so, and he left on the visitor's book the concise expression, 'Everything that could be desired.'

ON THE INTERPRETATION OF WATER ANALYSIS FOR SANITARY PURPOSES.*

By Horace Swete, M.D., San. Sci. Cert., Camb.,
Medical Officer of Health Droitwich Rural and Urban Districts, Analyst to the county of Worcester, etc.

The object of this paper is to draw the attention of Sanitarians to the fact, that in reporting on the fitness of a water for drinking purposes, it is not sufficient to draw definite conclusions from the bare details of the chemical analysis, without regard being paid to the geological and sanitary surroundings of its source, and the microscopical characters of its deposit; indeed, I may go further and state, that without this regard, the mere chemical analysis does not give, as far as present processes go, sufficient data to draw any hard and fast line as to whether a water should be condemned or otherwise. It is evident, that whilst the analysis of a sample of ore, or even the mineral ingredients of a water residue, give reliable results, that of the organic matter in water may be dependent on various sources, some (as excreta of typhoid) dangerous, and possibly fatal in its results; whilst the organic matter derived from a decaying pump-tree, or peaty matter, may be comparatively harmless, or a water, that in its typical state, as in some of the Welsh waters, is of extreme purity, will, by a very small addition of organic matter, prove suspicious of the contamination of typhoid excreta, if that should be present in the neighbourhood of its source; whilst, on the other hand, in the porous marls of Worcestershire, a water may show a very much larger amount of organic matter, when the surroundings may be free from any injurious contamination; and yet, by the hard and fast line adopted by many analysts, the former would be reported as a wholesome water, and the latter much polluted. The processes in use for the quantitative analysis of water may be classed under two heads. 1. Those that deal with the residue, after the water has been evaporated to dryness. 2. Those that deal with the water itself, as it is used for drinking. As we have to deal with the water as used by the public, the latter system, if the processes are equally reliable, will evidently afford the most useful information.

Of the first system, the process of Dr. Frankland may be considered the type. In this the residue is burnt at a red-heat, in the presence of a body capable of giving up its oxygen; the gases formed, collected and estimated directly, both nitrogen and carbon being thus determined as existing in the organic matter contained in the water. The nitrogen exist-

* Read at the Sanitary Congress at Croydon, October 22, 1879.

ing as ammonia, and that arising from nitrites and nitrates is a matter of separate determination.

In this system, Dr. Frankland shows the ratio of organic carbon to organic nitrogen. The nitrogen of the nitrates and nitrites being compared with the nitrogen derived from a given amount of recent London sewage, is considered by Dr. Frankland to show the amount of previous sewage contamination already oxidized in the sample of water examined. The chlorine, and the amount of residue in the water, are determined and used as data for a report in this, as in all other systems. Dr. Dupré estimates the carbon by evaporating the water in a thin silver dish, with phosphoric acid; he then, to avoid loss of residue by detaching the residue from the dish, crumples it up, and introduces the dish, with the residue, into the combustion tube, oxidizes in a current of oxygen, and receives the carbonic acid formed into Baryta water, estimating the precipitated carbonate of Baryta as sulphate. In the second system, Mr. Wanklyn's process may be considered the most important. A given quantity of water is distilled, and the ammonia estimated by the Nessler test; the remaining water is treated with an alkaline solution of permanganate of potash, by which more or less of the nitrogenous organic matter is broken up, and ammonia formed, which is again estimated by the Nessler test. As this action takes place in albumen, when treated in a similar manner, he calls it by the distinctive name of 'Albuminoid Ammonia'. He carries on a similar process still further, by which he is able to determine the whole of the oxygen required to oxidize the carbon and hydrogen, and under certain circumstances the nitrogen existing in the organic contamination of water. This Mr. Wanklyn denominates 'moist combustion', in contra-distinction to the combustion of a dry residue at a red-heat. He has protected this process by a patent. The operation is conducted, as shown in the specification, by boiling to approaching dryness a sample of water with a known amount of permanganate of potash, rendered strongly alkaline, reducing the excess of permanganate of potash, and precipitated oxide of manganese, rendered acid by sulphuric acid, by ferrous sulphate, and titrating back with permanganate, the result showing by calculation the actual amount of oxygen consumed in oxidizing the organic matter in the water. The chlorine, nitrates, and nitrites, as well as the solid residue, are estimated in the usual manner. Dr. Tidy, whilst adopting both the Frankland and the albuminoid processes, uses an adaptation of the permanganate process of Forchhammer, which he calls 'the oxygen process'.

This consists in acting on a given quantity of water in the cold for six hours, by permanganate of potash rendered acid by sulphuric acid, noting the changes which take place at definite intervals of time, and standardizing by an iodine solution and thiosulphate of soda. This process partially oxidizes the organic matter, so that it really may be considered a process of 'limited oxidation'. Dr. Tidy considers the changes noted, at definite intervals, of importance, as showing the more speedy oxidation of putrescent matters than those of more stable constitution, and thus pointing out matters in water which are dangerous to health more clearly than in other processes. The limited time allowed to a paper has not allowed me to enter more fully into the details of these processes, nor to notice other colorimetric and quasi-quantitative processes proposed by some analysts. Those who undertake analysis of water are doubtless familiar with them. In these processes, then, the following are the data upon which a report to a Sanitary Authority would be founded. Dr. Frankland estimates the solids, the relation of organic carbon to organic nitrogen, ammonia, nitrogen, as nitrates, and nitrites, total combined nitrogen, previous sewage contamination, chlorine, and hardness. Mr. Wanklyn estimates the solids, ammonia, albuminoid ammonia, nitrogen as nitrates, and nitrites, chlorine, hardness, and the total amount of oxygen to oxidize the organic matter. Dr. Tidy estimates the solids, the relation of organic carbon to organic nitrogen, albuminoid ammonia, and the oxygen required to partially oxidize organic matter in six hours; he also quasi estimates the oxidizable putrescent matter.

Now, are all these processes equally reliable to afford correct data? I must confess, I approach this question with some diffidence, especially with regard to Dr. Frankland's process, as I have no practical knowledge of its working details. It has been said that the process requires specially skilled manipulations; this, however, is no argument against it, as the skill should, if needed, be sought for and obtained by the professional analyst; there is, however, an objection to its general use, even were it in every point the best system; in that the necessary apparatus, if sufficiently delicate to give accurate results, is extremely costly, and that the amount of time consumed is such that any remunerative fee would be out of the reach of Sanitary Boards, who, under the recent legislation, are required to have frequent examinations of the drinking water of their district; in fact, to myself and many others, the expense of working the process, and value of time employed, make it prohibitive.

It is argued that in this system, some volatile organic matter is lost during the evaporation of the water to dryness, that some of the organic matter resists being burnt up; that organic matter is lost by partial decomposition by the oxidation of sulphurous acid, and that there may be error from incomplete decomposition of nitrates, etc. Still, it has always appeared to me that the knowledge of the ratio of organic carbon to organic nitrogen is of value in forming an opinion of a water, and that the amount of previous sewage contamination, when relegated to the water itself, and not arising from prehistoric geological changes, has also some weight. Much discussion has arisen, by comparing the probable value of this and other systems, the leaders and followers of the processes taking naturally strong views on the subject; but, as in other schools of thought where differences exist, it seems to me the old and trite saying may be used—'Good in all, but none all good.' This is, however, not the time or place for lengthened discussion on a purely chemical subject, the object of the Congress being to advance sanitary knowledge, and that of my paper to see if more light may be thrown upon the nature of potable water, by supplementing the chemical data by other observations.

It is likewise objected to Mr. Wanklyn's albuminoid process, that the albuminoid ammonia does not represent the whole of the nitrogen derived from organic matter, as if substances, as alkaloids of known composition are treated by the process, they do not give off the whole of their nitrogen, nor do they, in part, in any equal ratio. Mr. Wanklyn does not, however, profess to directly estimate the nitrogen, but to obtain sufficient data to report upon the wholesomeness or otherwise of the water examined. A somewhat similar objection is urged against Dr.

Tidy's oxygen process, that it is partial in its operation, and that it does not, as in a boiling alkaline solution, break up the entire constituents of the contaminating body. He does not, it seems to me, claim that his process is one of complete oxidation, but that it gives valuable information as to the more rapidly oxidizable bodies which he considers of dangerous import in different waters.

The process that appears to be really reliable in estimating the absolute amount of oxygen required to oxidize the organic matter, is the 'moist combustion process' of Mr. Wanklyn. I know that some take objection to its being a patent process; but, for myself, I can say I have never regretted the outlay to enable me to use it, in comparison with the opportunity of obtaining more correct chemical data, upon which to found an opinion that may be useful to a Sanitary Authority. I have used this process in the examination of about 200 waters, and to satisfy myself on its reliability in estimating the whole of the oxygen required, have, with Mr. William Bettel, carried on experiments in my laboratory, on the moist combustion of known quantities of various alkaloids, and compared the results with those obtained from Dr. Tidy's oxygen process. I do not lay claim to rigid accuracy; the alkaloids have been taken from the bottles in my laboratory, supplied by Messrs. Hopkins and Williams, and I have only the command of an ordinary analytical balance, guaranteed to half a milligramme, although with care it will work to one-tenth of a milligramme.

Time has not allowed us to undertake more than three analyses, in the first of which, codeine, we made four separate determinations; the conduction of these experiments was an after-thought during the writing of this paper, as it appeared to me that such investigations would strengthen the claims of a comparatively new process, although it cannot altogether be called new, at least to the author of the process; the determination of the albuminoid ammonia being also a moist combustion, in which the nitrogen evolved as ammonia is estimated to the exclusion of the oxygen; whereas, in the other, an almost similar process is made use of, where the oxygen is estimated to the exclusion of nitrogen. The following are the changes which appear to us to take place during the moist combustion of codeine, narcotine, and meconic acid, two of these being nitrogenous substances:—

Codeine—

$$C_{36}H_{42}N_2O_6, 2H_2O + 44O_2 + 73\,KHO = 36\,K_2CO_3 + KNO_3 + NH_3 + 58H_2O.$$

Narcotine—

$$2C_{44}H_{46}N_2O_{14} + 98O_2 + 178\,KHO = 88K_2CO_3 + 2KNO_3 + 2NH_3 + 132H_2O.$$

Meconic Acid—

$$2C_7H_4O_7, 3H_2O + 9O_2 + 28KHO = 14K_2CO_3 + 24H_2O.$$

It will be observed that in these equations we have adopted molecular formulæ; we have also found, on examination of the residue of the codeine and narcotine, that half the nitrogen remained in the oxidized form of nitric acid, combined with potash. It seems to us not impossible that this behaviour of the nitrogen may account for only a portion of the nitrogen contained in organic matter in water, not being estimated as albuminoid ammonia, but remaining in the retort as nitrate of potash, in the albuminoid ammonia process. This gives rise to the impression that Mr. Wanklyn will, before long, further develop his useful process, and render it still more available for the absolute determination of pollution in potable water. The result of our experiments has been as follows, and we have contrasted them with similar experiments on the oxygen process.

Moist Combustion Process.

	Taken in mgrms.	Mgrms. of O required in theory.	Mgrms. of O obtained in practice.
Codeine	4.9	10.88	10.6
Narcotine	8.8	16.70	16.6
Meconic Acid	10.2	5.78	5.9

Oxygen Process.—Time Six Hours.

	Substance taken in mgrms.	Mgrms. of O required in theory.	Mgrms. of O obtained in practice.
Codeine	3.6	8.0	4.2
Narcotine	6 5	12.29	8.7
Meconic acid	6.0	4.3	3.3

In conducting the oxygen process with these alkaloids, we found that with codeine and narcotine (nitrogenous bodies) oxidation took place very speedily, nearly all the changes taking place in the first two hours; whilst, with the meconic acid, containing no nitrogen, oxidation was extremely slow. If further investigation confirm this action on nitrogenous bodies, this process of limited oxidation will prove of increased value in showing more clearly the waters that are contaminated with nitrogenous, and therefore with more noxious bodies, as far as health is concerned.

It is not one of the least of the advantages of the albuminoid and moist combustion processes, that they are executed with ease and celerity, and with the use of the ordinary apparatus of the laboratory. I have used these processes in a country inn, with a small glass condenser and spirit lamp, using 100 cubic centimètres of the water, and have obtained as satisfactory results as when enjoying the greater comforts of a regular laboratory; still, the very facility of operation leads to the danger of error in careless performance of the processes. It is absolutely necessary that the apparatus should be perfectly clean, and washed with concentrated sulphuric acid, that the distilled water should be free from organic matter (to obtain this, it must be re-distilled over permanganate of potash), and that the permanganate of potash solution for the albuminoid process should be distilled until it is free from ammonia. The standardizing with Nessler must be done at once, and in all cases, artificial colorimetric standards not being reliable. The Nessler re-agent, when properly made, and recently sharpened with mercuric chloride, can be standardized at once, without waiting for any growth of colour.

In addition to the determination of the chlorine and solid residue, it is important that the nitrates and nitrites should be determined, or at any rate a quantitative testing should be made. The colour of the water in a two foot tube gives much information, and this observation is too frequently neglected.

Now, having gained these chemical data, will they be sufficient without further observation or knowledge of the source of supply, to enable us to give a reliable report. I may answer yes, in bad waters, for there the data will be in excess, and there can remain no reasonable doubt in our minds; but, without more general information, many polluted waters may be passed over, and apparently bad waters condemned without sufficient reason. The following extracts from notes of water analyses in different localities will illustrate my statement.

In these tables we shall see that there is a considerable difficulty in using a hard and fast line in the interpretation of results. Professor Parkes states that the total solids of a wholesome water should

not exceed eight grains per gallon, unless in the chalk, when he allows 14 grains. Dr. Wilson, in his well known hand-book of Hygiene, allows 30 grains, whilst Mr. Wanklyn does not condemn a water in which the solids do not exceed 40 grains in the gallon; now, in the first table there are very few waters out of 232 samples that give as low an amount of solids as even 40 grains per gallon; these are waters of surface wells in the new red sandstone, containing frequently large amounts of lime-salts, especially sulphate of lime, and chlorides in excess; were they to be condemned for this fault only, where should the inhabitants obtain their water from? I certainly do not think such waters of a high class of wholesomeness, they are very hard; but, independently of this, some are largely polluted with organic matter, in consequence of which, most of these wells are now closed, and a town supply of good water substituted. In Leamington, nearly all these wells are closed, and a deep artesian well-supply substituted; the same may be said of Coventry. In the urban district of Droitwich, a new supply from a pebble drift under the marls, giving a water of a high degree of purity, has just been opened.

Waters in Porous Strata.

	Solids.	Chlorine.	Free NH_3.	Alb. NH_3.
Leamington—100 waters (30 good):—				
Lowest	21	1.5	.00	.05
Highest	216.8	19.	1.76	.48
Average	101.7	7.4	1.50	.18
Droitwich District—100 waters (23 good):—				
Lowest	36	1.5	.00	.07
Highest	261	52.5	1.13	.90
Average	73	18.	.13	.20
Dudley—7 waters (2 good):—				
Lowest	28	2.7	.00	.08
Highest	143	33.	.48	.36
Average	87.8	13.6	.19	.19
Coventry—10 waters (3 good):—				
Lowest	32	1.9	.02	.02
Highest	134	9.2	1.60	1.22
Average	64.3	6.1	3 72	2.03
Nuneaton—15 waters (7 good):—				
Lowest	21	1.6	.01	.02
Highest	119	14.5	.56	.20
Average	46.4	6.2	.13	.07

Water Analysis. TABLE NO. 11.

	Solids.	Chlorine.	Free NH_3.	Alb. NH_3.
Worcestershire:—				
Normal	63	2.5	.02	.08
Polluted	64	8.0	.00	.16
Warwickshire:—				
Normal	35	2.8	.00	.07
Polluted	166	16.0	.08	.13
Radnorshire:—				
Normal	11	0.7	.00	.04
Polluted	22	1.5	.06	.10
Lancashire:—				
Normal	10	0.6	.00	.02
Polluted	13	0.9	.01	.08
Pembrokeshire:—				
Normal	10	1.8	.00	.01
Polluted	14	2.5	.04	.09

The chlorine has frequently been supposed to be indicative, *per se*, of sewage contamination; but in the first table, the chlorine is for the most part excessively high, and yet sixty-five of these waters are uncontaminated, the new red sandstone being a salt bearing strata. On the other hand, in the second table, some of the waters not exceeding 2.5 grains of chlorine to the gallon have been directly polluted with typhoid excreta. The ammonia, especially albuminoid, will also be found to present much the same results. Mr. Wanklyn states that water, .05—.10 of albuminoid ammonia, in the million parts, is a safe water from .10 upwards, dirty and suspicious; but the water should be absolutely condemned if it reaches .15. I agree with the latter sentence; but the safe waters, I think, are often open to grave suspicion. The second table is drawn up to show that no hard and fast line can be entirely depended on in interpreting the sanitary value of the amount of albuminoid ammonia. I have, in various counties, contrasted the amount of albuminoid ammonia, which has appeared to me to be normal, with that obtained from a water which I have reported as polluted. In Worcestershire and Warwickshire, I have taken wells in which, although there is undoubted pollution, no illness has resulted from the use of the water; whereas, in Radnorshire, Lancashire, and Pembrokeshire, I have contrasted the normal water with that of a well which has been the direct cause of an outbreak of typhoid; that in Radnorshire was remarkable as a well apparently removed from all sources of pollution, was evidently the cause of a severe and fatal outbreak of typhoid; inspection showed it was contaminated by the overflow of a brook during flood, into which, at two miles distance, typhoid excreta had been freely thrown; now, in these three examples, the albuminoid was only .10, .08, .09, so that, at the most, they would only have been considered suspicious, and most probably been reported wholesome; this was certainly the case in the Pembrokeshire well, which, in three analyses, was reported to be a good water; all these analyses have been made of wells I have personally inspected, and seen the source of pollution. By contrasting the analytical result with the normal well, the extra amount of albuminoid is much the same as in the cases alluded to in Warwickshire and Worcestershire.

Warwickshire	...	normal albuminoid	.08
.08 + .08	...	polluted well	.16
Worcestershire	...	normal	.07
.07 + .06	...	polluted	.13
Radnorshire	...	normal	.04
.04 + 0.6	...	polluted	.10
Lancashire	...	normal	.02
.02 + .07	...	polluted	.09
Pembrokeshire	...	normal	.01
.01 + .08	...	polluted	.09

The two former wells being in a porous strata, the three latter in a hard impermeable stone. I think these examples will show the value of actual inspection of the water, or at any rate, of reliable information as to its surroundings, and of obtaining, if possible, a knowledge of the normal condition of the water of the district. The free ammonia, also, must not always be referred to sewage. In the mineral springs of Radnorshire and Brecon, I have found a large quantity of free ammonia, under surroundings that preclude any suspicion of contamination. The fact is, that this ammonia occurs from old volcanic action, the mineral springs arising from the contact of trap-rocks, with the slate and the decomposition of sedimentary deposits. Deep wells, also, contain nitrates, especially in the chalk, where the previous sewage contamination is certainly prehistoric. The moist combustion process, also, gives us curious information at times. I recently examined a well water which gave as much as 72.5 milligrammes of oxygen to oxidize the organic matter in a litre; this water was polluted as well, with nitrogenous matter; this great amount, on inspection of the well, proved due to the decay of an old wooden pump in the well—ordinary polluted waters requiring from five to seven parts per million of oxygen. Another water, under similar circumstances, required 62.5 of oxygen to the litre. I think the knowledge of the surroundings of a water so important, that in my own district I have supplied the inspectors with the

following label, taken from a form proposed by Dr. Cornelius Fox :—

DROITWICH RURAL SANITARY DISTRICT.
Sample for Analysis.

Date of collection ... ...
Source ... ...
Depth of well ... ...
Nature of soil ... ...
Distance from nearest source of pollution
Why complained of? ... ...

Many people think, by withholding information, that they get what they call an independent opinion. This is quite wise in the analysis of adulteration of food, but with water, the more information given to the analyst, the more reliable will be the opinion given.

Time does not allow me to touch upon the microscopical appearance of the deposit; the value of this must be apparent to everyone, but it is not easy to give all the information we may wish in the short space of twenty minutes, the Congress allows for a paper. I have endeavoured to avoid partizanship, and to give every analyst his fair due. I only trust, that in my desire to be as concise as possible, I have made the matter sufficiently clear.

THE DANGERS OF BAD PLUMBING.*

BY. W. EASSIE, C.E.

DURING the Exhibition which was held in Leamington in 1877, I contributed some remarkable specimens of mal-construction in plumbing, and also some curious examples of leaden pipes into which holes had been gnawed by rats while seeking ingress to a house. I also showed several pieces of sheet lead which had been completely perforated by worms that had previously destroyed the unseasoned roof boarding underneath. In the present Exhibition I have laid upon a table some still more remarkable examples of defective and dangerous plumbing; and I may add that each specimen which I exhibit has been associated with death and disaster in some shape or other. In the few remarks which I will now proceed to make, I will endeavour to classify under the heads of Imperfect Jointing and Improper Treatment of Wastes, the sources of some of the evils complained of, so that each specimen may point its moral.

Imperfect Jointing.—These faults will mostly be found in soil-pipes. For instance, there is a slip-joint, properly so called, in which one portion of the soil-pipe has simply been dropped into another, without any filling-up material or solder. A necessary result of this is that the sewer-gas escapes at all times into the house, when the soil-pipe has to be erected in the interior of the house in the ordinary wall chases. Even when the soil-pipe had been led outside the house I have come across notable examples in which the sewer-air has escaped from these open joints, and found an entrance into the house by way of the open windows. Cases of death due to this improper delivery of soil are very common indeed, and the victims are mostly servants who sleep in attics, the windows of which open above these pipes. Sometimes, even when the joints have been properly made with solder, but when the soil-pipes inside the house have been insufficiently tacked to the wall or insufficiently supported, the weight of the soil-pipe has sufficed, by dragging action, to open the joints, with the usual bad consequences. It is not an uncommon occurrence to lay bare soil-pipe joints which have been made with putty, and tied over with canvas; or red-lead joints, without the slightest attempt at soldering; and when these joints were dry, an open annular seam has appeared, which has allowed an exit for the sewer-air. Joints of this description are almost invariably found in the older class of houses, and I have exhibited, on several occasions, pieces of soil-pipe, not more than 2 ft. in length, upon which could be noticed each one of these samples of improper jointing. I need hardly say that faults of this kind are mainly attributable to the carelessness of the workman, who has been content with the worst of patching, instead of insisting upon an entire replacement of the worn-out pipe, as was his duty. I am only too well aware that very often the builder has orders from the owner to carry out the very cheapest repairs; but this ought not to be a valid excuse, because it is neither workmanlike nor businesslike to treat so serious a matter as a soil-pipe in this way, and he ought to know very well that a soil-pipe cannot fulfil its duty properly unless it can sustain a column of water inside without trickling at the joints; and when the builder observes, upon taking down the casing, that a pipe has become eaten into holes by sewer air, or abnormally thin, he should know that no amount of patching he can devise will remedy the defects, seen and unseen, in such a case.

The corrosion of soil-pipes into holes is almost entirely due to the action of sewer-gas, and will always be found present in some portion or other of an old soil-pipe which has never been ventilated. Where disinfectants of certain kinds are freely used, the decay of the lead is greatly accelerated. When a soil-pipe of this description is laid bare, the safest way is at once to remove it, and to replace it by a drawn lead soil-pipe of proper thickness, duly ventilated by a continuation of the same diameter of pipe up to the roof, remote as possible from windows and chimneys.

There is another thing which a builder has a perfect right to refuse to do, and that is to lead the soil from a water-closet into a rain-water pipe which descends inside the house, or has its extremity near any window. This is a very frequent cause of illness, even when such a rain-water pipe, made to do double duty, is led outside the house; as, for the most part, it will be found that the upper extremity delivers foul air perilously near the inmates. During the past year I have known cases of death traced to this very fault. The evil factor in such improper treatment is multiplied when the pipe has not been made of lead, but only of lengths of thin cast-iron down-pipe, which cannot properly be jointed or made air-tight. I say that no responsible builder should ever consent to the erection of such inadequate soil-piping, or only upon the specification of an architect or engineer who dare risk it under certain conditions. Nor ought any one to make use of an iron soil-pipe outside the house, unless it be thoroughly disconnected at the foot, and a current of fresh air thus continually passed through it.

Improper Deliveries of Wastes.—A very large percentage of the waste-pipes of sinks are led direct into the drain, with only a bell-trap inside the room, which is oftener than otherwise broken, or with its upper portion removed for the convenience of passing down, quicker than is needful, the pantry and other sink wastes. As a result of this, and especially

* Read at the Sanitary Congress at Croydon, October 1879.

in butler's rooms, where he perforce sleeps, in order to be close to the strong-room, a regular highway for foul air is established into the rooms, bringing with it sicknesses of many kinds. It is the same too often with housekeepers' rooms and servants' halls, in which sinks have been placed, and servants who are often obliged to pass the greater part of the day in such rooms suffer in consequence. The only remedy against this state of things is to cause the sink to deliver over the trapping water of an open gully outside the house, no matter what distance the pipe may have to go to reach the exterior of the building, and to provide, as well, a trap underneath the sink itself, in order to keep out the cold air and the effluvium arising from the decomposing wastes in the gully. This latter is a point which is often overlooked.

The above state of things is sufficiently bad, especially in a large household, too profusely equipped with sinks in the basement; but it is, perhaps, nothing to be compared to the improper entries of housemaids' sinks into soil-pipes or D-traps of closets. In nearly every instance when a foul smell is discernible upstairs it will be found to arise from this improper connexion between these wastes and the soil system. I am not now speaking of properly-constructed housemaids' sinks, with ventilated traps underneath, which are purposely constructed for the removal of bed-chamber slops of all kinds, because these may be allowed in such cases to enter a properly-ventilated soil-pipe; but I refer rather to sinks merely intended to remove away the drips from hot and cold water taps, in which case the danger is greatly enhanced by the sinks being placed in passages close to bedrooms and in proximity to the great air-shafts formed by the staircases. These kinds of sinks should invariably deliver in the open air, and may sometimes be conveniently and safely led to the upper head of a rain-water pipe.

Another disgraceful system which obtains in many houses, even of very modern construction, is the leading of the cistern-waste or overflow into the trap of a closet. I have this year exhibited some startling examples of this dangerous practice, and I must most earnestly call attention to the fact that drinking-water is contaminated in this way to an extent which must be incredible to any one who has not made the sanitary inspection of houses his special study. I have come to the conclusion that the wisest way to avoid the dangers consequent upon this improper treatment of a cistern-waste is to treat the latter as an overflow, and point it through the wall in all cases where a standing-waste cannot be led to deliver in the open air.

The few remarks which I have made upon the subject of the delivery of housemaids' sinks into the D-traps and P-traps of closets are equally applicable to the wastes and overflows of baths. An examination of my pilloried specimens will show that this practice is far too common. One can observe there the traps of closets, into one of which have been led the waste of a cistern supplying drinking and closet-flushing water, the waste of the housemaid's sink, and the waste and overflow of a bath. As may be observed there also, the wastes of baths, sinks, and cisterns have been taken into both cheeks of one D-trap. It is bad enough to place the bath in the same room as a closet, and I wonder how architects can persist in this evil associatlon, but it is something horrible to think that the delivery of the bath-waste is into the very foulest conduit. And yet this latter mistake is one very constantly practised by plumbers who at least ought to know better, and who ought to feel themselves in a position to refuse to carry out such a practice, even if ordered to do so by a clerk of works. I have known instances in which death has entered a household by way of a bath-pipe thus dangerously connected, the danger being enhanced by the frequent contiguity of bath-rooms to bed-rooms.

Nor can it be said that these errors of judgment, or worse, apply only to old houses, for I exhibit samples of closet-traps, with bath, cistern, and sink entries, which are palpably but lately from the plumber's hands. In the majority of cases the excuse cannot be urged that these mistakes have been perpetrated in order to save money or to scamp the workmanship, because many of these traps are really excellent specimens of skilled labour, and in some of them the wonder is how the pains-taking workman could have brought his soldering-iron into play and the wiped joints in so small a space. The faults are entirely, in such instances, due to total ignorance of sanitary principles, and to a slavish following out of the traditions of the workshop.

When we come to the water-closet itself, we are all bound to admit that there is a great deal still to be done in providing a faultless apparatus. Most horrible examples of death-dealing closets are to be found, especially in the area vaults of our best town houses. I should, above all, like to see abolished the filthy D-trap, with its furrings of fœcal matter, the huge iron container, with its linings of ancient ordure, and the trap at the foot of the soil-pipe, with its excremental cess-pit. I would even like to see abolished all traps whatsoever to closets, and I am convinced that if plumbers would only follow the lead of our more advanced sanitarians in this respect, or at least more largely patronise the earthenware closets, that much solid good and absence from disease would accrue to the community. It is almost criminal for builders still to persist in the use of the pan-closet, which, to my knowledge, was condemned by Mr. Chadwick nearly forty years ago, and how they can insist on fixing this dangerous contrivance without a ventilating pipe, is more than I can fairly understand. I will not believe for a moment that its use is continued in order to sell the D-trap with it, the making of which occupies the time of the apprentices, or to provide for a regularly recurring bill of repairs; but those who persist in its use lay themselves open to the charge that they are introduced for no other purpose. I think the sole reason for the patronage it obtains is to be found in ignorance, and a false estimate of its economy and cheapness of erection. And I am persuaded that if our builders would only take to heart the lessons taught by the inspection of the much better articles seen at the present day in sanitary exhibitions, they would refuse to have anything more to do with it.

There is another fault concomitant with the use of nearly all closets, and that is the leading of the waste of the tray or safe under the apparatus into the closet-trap. It is almost invariably taken there in the commoner houses, and in a very large percentage also of the better class houses even yet, and one half the smells which encounter one on entering into a closet-room is due to this lamentable want of common sense and forethought in dealing with the closet essentials.

It is, perhaps, somewhat too much to expect that our tradesmen are all acquainted with the necessity for the disconnexion of the house-drains from the sewer by means of any of the numerous disconnec-

tion traps, constructed on various systems, now in the market. But until such a trap is provided between the house and the sewer, at some part of the house-drain, the work has been only half done. Nor can there be obtained any absolute safeguard from sewer-air or house-drain gas, or any thorough ventilation of the horizontal drain or vertical pipes, until some method of absolute disconnexion be practised, and fresh air taken in at such a trap in order to be discharged at the ventilating pipes. No plumber, however perfect his work, can hope to witness really satisfactory results from his labour until this disconnexion has been achieved.

THE

SANITARY RECORD.

NOVEMBER 15, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

IMPORTANT EXHIBITS AT THE SANITARY EXHIBITION AT CROYDON.

ONE of the most important novelties at this Exhibition was undoubtedly the material for building purposes produced by Mr. Lascelles, of London, for paving, fire-proofing, ornamental construction, and domestic uses. The material can not only be used for flooring, street paving, kerbs of roads, steps, sills, but for windows and architectural finishings, and chimney-pieces. It will also be found applicable for the surrounding matrix of iron in constructions intended to resist fire; while for baths it will have, we should imagine, no equal in point of cheapness and ability to resist the alternations of heat and cold, as has been proved by hard trial. This material may almost be said, in its inception of manufacture, to have created a new industry, for it is constructed simply from coke and cement, or furnace clinker and cement. Coke and cement are used for the lighter castings in architecture, and furnace clinker, previously broken up, for the heavier articles, such as pillars. The manufacture of this new material has been going on quietly for the last two years, but it has now assumed greater proportions at Stratford-by-Bow, where the works are at present situated. There is no purpose for which terra cotta is used which cannot be equally well fulfilled by this novel concrete; and just as we see in the same exhibition the refractory fire-clays eclipsing, if not even superseding, the china clays in the manufacture of terra cottas, so concrete is taking its place in the arts and manufactures. The bath exhibited by Mr. Lascelles is simply extraordinary in point of cheapness, and it can apparently be enamelled at but little extra cost.

Another most important branch of industry in the present day is the manufacture of pavement lights which shall shed daylight, by some method, into cellars. We have the Patent Translucent Gratings of Messrs. McCulloch, of Glasgow, by the use of which the light can be directed to any side, or equally diffused; and we have the old-fashioned but improved deck-light transmitters of white flint-glass, admittedly so great an improvement on the semi-opaque rough green plates of glass. Mr. McLean, of London, the introducer of the latter improvement, has also his universal glass-light, which combines the maximum of diffusion without, it is asserted, interfering with the maximum of reflection brought about by alternating lenses. We did not notice any of the above in the Exhibition, but we came upon with approval, the perhaps still more ingenious pavement, roof, floor, and flap-lights of Messrs. Hamilton of London—more ingenious certainly as regards the ease with which, for instance, cellar flaps can be opened and broken lenses replaced. The lenses are alternately convex and prismoidal, and no ray of light is lost, as was clearly demonstrated in the dark tent where the oxy-hydrogen light was in use. There is a great future for these translucent gratings for pavement lighting, and if the improvements continue to grow, as these last manufactures lead one to think they will, there need hardly be any subterranean or cellar darkness at all, save where it is wanted, as in a mushroom-growing corner, or in wine-cellars.

Another and even more important amelioration of existing difficulties is met by the improvements shown in filtering water. We need not now allude to the filtration of spring, river, or well waters, as the names of the appliances for this purpose is legion, but to the more difficult matter of rendering rain-water fit for culinary use. Foremost among the improved contrivances for this purpose is the Patent Percolator of Mr. Buck, by the use of which the rain-water falling on the roof is cleansed of its greatest impurities, and the work of any ground filter before the rain-water collecting tank thus rendered lighter. The Percolator acts in this way: When the rain-fall exceeds the discharge in the first hole of the two compartments which compose it, the water rises to an aperture leading to a second compartment, and when this is filled, the Percolator is overbalanced in order that the discharge should be led by way of a second down-pipe to the pure water storage tank. The object of the percolator and the twin down-stack pipe is to provide for the removal of the water which first falls upon the roof, with all its impurities, soot and bird refuse, either to waste or to a separate tank for ordinary purposes, such as coach cleansing, and for the removal of the next following downpour to the tank intended to store the purer element for laundry or kitchen use. It thus rejects the bad and stores the good water, and accomplishes this feat in automatic fashion.

Another and equally valuable exhibit is the *Filtre Rapide* of Mr. Maignan, also of London, to which we have previously referred in these columns. Its adapt-

ability for filtering the water from the cisterns of water companies by means of filtering frames covered with strainers and added charcoal dust, is very evident; but we will now refer to its wonderful simplicity of action in cleansing ordinary rain-water. Here frames are used covered with felt or flannel, assisted with a little vegetable charcoal, and in a few moments the water is clarified and fit for ordinary uses. When the filter is choked, say after a few months' use, it is only requisite to remove the strainers and brush them over, removing at the same time the collected leaves and stray impurities.

We do not think we err in classing the above novelties as four of the most important exhibits, and exhibits, too, calculated to work immense good in the proximate future of household sanitation. We have already given extended notices of other valuable exhibits, and need only say, in conclusion, that we consider this Sanitary Exhibition the most important hitherto presented to the public by any institution up to the present time.

NOTES OF THE MONTH.

THE ETIOLOGY OF INFANTILE DIARRHŒA.

At the recent annual meeting of the Yorkshire Association of Medical Officers of Health, Dr. Barry of Settle proposed that a committee should be appointed for the purpose of investigating the etiology of infantile diarrhœa. The proposal was seconded by Mr. S. P. Atkinson of Pontefract, and unanimously carried. The Committee appointed comprises the following members: Mr. H. Butterfield, Bradford; Dr. T. Button, Halifax; Mr. S. B. Atkinson, Pontefract; Dr. T. Scott, Ilkley; Dr. J. Mitchell Wilson, Selby; Mr. S. W. North, *President*, York; Dr. F. W. Barry, *Secretary*, Settle. Medical officers of health and others will materially assist in this interesting and much-needed inquiry if they will forward any reports or suggestions bearing upon the subject to Dr. F. W. Barry, Settle.

'SUFFOCATED BY BED-CLOTHES.'

The 'overlaying' of children which figures so largely as a cause of death in coroners' reports commonly means drunkenness of mothers. Hence it is not surprising that a noteworthy point of difference between the Massachusetts reports and those of England, is in the number of cases of infant suffocation in bed—one only appearing in the reports for 1878; while in a single year one English coroner held ninety inquests on children 'overlaid', or suffocated in bed. Most of these English cases occurred on Saturday night. In eight years 3,606 were 'suffocated by bed-clothes' in this country.

SCHOOLS AND SCARLATINA.

Scarlatina has been very prevalent in East Sussex, and we learn from unquestionable authority that it has been entirely confined to the children attending the public day schools, or their brothers and sisters. This is a suggestive fact and goes to confirm the opinions constantly expressed in those columns as to the imperative necessity of close investigation into the deaths of children attending school, and the exclusion of any coming from an infected home.

LEAD IN SODA-WATER.

Howell Lewis, charged with selling soda-water from a cart, which was proved by the borough analyst of Cardiff to be simply water charged with carbolic acid gas, and containing lead, was fined 40s. and costs. According to Dr. Dupré, writing to the *Analyst*, Prof. Attfield has defended the sale of soda-water containing 'not more than ¼ grain of lead to the gallon'. However defensible chemically, the use of such a daily beverage would hardly be other than poisonous in the long run.

RE-VACCINATION AT SCHOOLS.

We have been favoured with a copy of a circular letter addressed to the parents of his pupils, by the very Rev. T. S. Kearney, principal of Ampleforth College, near York, on the important subject of re-vaccination. Dr. Kearney adverts to the necessity of the performance of re-vaccination at about the fourteenth year, when boys are usually at schools or colleges, and to the desirability of the operation being performed at leisure instead of under the alarm and influence of a panic, fortifying his observations with quotations from official utterances. He therefore asks the sanction of parents to the re-vaccination of their boys by the visiting physician of the college. This circular seems to us eminently well-timed and judicious, and we should be glad to see Dr. Kearney's example followed by every college-principal throughout the country.

FAT IN MILK.

We see with great satisfaction that the Somerset House analysts have now come to a conclusion as to a standard for fat in milk. They have decided apparently that genuine milk sold should contain at least 2.5 per cent. of fat. This was the figure adopted years ago by the Society of Public Analysts, and it is very satisfactory to find that it is now endorsed by Somerset House. The absence of a recognised standard for cream has afforded the greatest facilities for the most common of all milk frauds—viz., the mixing of whole milk with skimmed milk in equal proportions constituting what is called half skimmed milk, which is now still very largely sold in London as whole milk.

THE PREVENTION OF TYPHOID.

The painful list of deaths of physicians and others who have returned home from their autumnal holidays, bringing with them the seeds of typhoid fever, contracted on the Continent through drinking the impure drinking-water of hotels, and watering-places, and foreign baths, has created a considerable impression. The *Lancet* vigorously describes the danger of using the ordinary drinking-water which the traveller gets put before him, in a terse sentence, in which it expresses the opinion that one might as well take the risk of drinking a deadly poison as swallow the contents of the water-bottle which is commonly put before the unwary traveller. Physicians, generally, are beginning to be on their guard against this danger; and Dr. Hermann Weber, our greatest authority on Continental travel in its medical aspects, recently published an earnest caution in this regard. He states that, personally, he always

procures Apollinaris water or corresponding mineral water, if it is to be had, when moving about away from home, and that he has known more than one instance in which a similar precaution has saved from typhoid fever persons whose companions, being less cautious, fell victims to it. There is, however, great reason to fear that the caution as to the avoidance of ordinary table-water of unknown source is not sufficiently exercised. There can be no doubt that the extensive introduction of pure natural mineral water, such as Apollinaris, has been, as Dr. Weber says, a great pioneer movement in favour of the prophylaxis of typhoid fever and pernicious diarrhœa. When all our sources of drinking-water shall have been rendered secure, it will be a happy day for the health of the people and for the cause of temperance. Meanwhile, the most sparkling and favourite waters from superficial wells, and the siphon or bottle of common soda water, are often so many traps for the unwary; and *Punch*, in recently drawing the skeleton grinning within the water-bottle, and over its head the word typhoid, only symbolises a danger against which we cannot be too much on our guard.

THE MILK OF COWS WITH FOOT AND MOUTH DISEASE.

Happily, at the present moment, the question whether the milk of cows suffering from foot and mouth disease is unfit for human consumption possesses no immediate interest; but it may at any time become of importance, and any facts tending to clear up what is still a moot point are therefore acceptable. It will be remembered that in 1869 an inquiry into the effects produced in the human subject by milk derived from animals suffering from foot and mouth disease was made on behalf of the Lords of the Council by Dr. Thorne Thorne. Mr. Simon, in commenting on the results of the inquiry, which were unfortunately negative in character, expressed himself as clearly of opinion that such milk ought not to be unrestrictedly sold for human consumption; and this view, which has received very general concurrence, is strongly borne out by some facts given by Dr. Paine in his last report on the health of Cardiff. Dr. Paine states that, concurrently with an epidemic of foot and mouth disease in the town, his attention was directed to a severe form of sore throat prevalent amongst children, especially in a neighbourhood where the foot and mouth disease existed in nearly every dairy. Although very severe, and in one or two instances coming under observation fatal, it differed in some of its essential characteristics from diphtheria. Its mortality was not nearly so great in proportion to the number attacked with the disease; there was none of the albuminoid secretion accompanying diphtheria, but the disease presented a vesicular character, attacking the uvula, tonsils, and pharynx. In two or three cases vesicular bullæ were observed about the finger nails. A very careful microscopical and analytical examination was made in every case when the samples of milk could be obtained, and evidences of a diseased condition of this secretion were rarely found absent. In all cases where this was discovered, the use of the milk was prohibited, and its prohibition marked the subsidence of the disease amongst the children in that locality. In the acute stages of foot and mouth disease, when the udder is affected, the secretion becomes less in quantity, and peculiarly rich in solid matter, and the constituent compounds are generally present in abnormal proportion. When chemical evidence could not throw much light upon the character of the milk, the microscope invariably disclosed some peculiarity foreign to healthy milk, and in most instances the appearances thus afforded were so uniform and conclusive as to leave no room for doubt that the milk was drawn from a diseased cow. It may be worth adding that on several occasions during the prevalence of infantile diarrhœa, samples of milk have been examined by the borough analyst, who has detected pus cells and hœmatine in the milk used by these children, and on inquiry, garget, or mammitis, has been found in the dairy from whence the milk was obtained. Dr. Paine suggests that it would be highly desirable that in all cases where children are suffering from infantile diarrhœa, the medical man in attendance should ascertain the quality of the milk supplied to the sick child. He says that he cannot but feel that the quality of the milk must in the future be regarded with suspicion as a probable excitant cause of diarrhœa; and a strong presumptive evidence of this is afforded by the circumstance that only four deaths from that disease occurred last year amongst the families of the Irish labourers, embracing a population in Cardiff of probably 10,000, their children being practically not fed on cow's milk.

THE HEYWOOD DISEASED MEAT CASE.

At the Heywood Petty Sessions, in September, a butcher named Leach was prosecuted by the Local Board for an offence under the 117th section of the Public Health Act, 1875. It appears, from the report of the evidence submitted to us, that on a certain Sunday morning the nuisance inspector for Heywood received intimation from the police that a dead cow had just been brought to Leach's slaughter-house in a cart. The inspector accordingly lost no time in paying a visit to the premises, and there he saw the defendant flaying the carcase of a cow, while his assistant was busy washing the blood out of the beast's lungs, which were swollen to twice the natural size. The lungs were full of blood, and the surface of the flesh was noticed to be covered with watery beads. He seized the carcase, and marked it, and informed the medical officer. Dr. Wiskin, the medical officer, said that he examined the carcase on the Sunday referred to, and his opinion was that the cow had died from inflammation of the lungs. The flesh was dark-coloured and watery, and the fat jelly-like in appearance; the carcase was not fit for human food. In cross-examination, the doctor said the cow might have died from apoplexy, but he considered disease of the lungs was the primary cause of death. A magistrate was called in, and the carcase was condemned. The only other important witness examined for the prosecution was the farmer to whom the cow had, in the first instance, belonged, and he stated that the beast had been found dead in the shippon on Sunday morning, whereupon he sent for the defendant to remove it. Witness objected to defendant sticking the animal in the shippon, and it was carted away as it was. For the defence two veterinary surgeons were called, who testified to having examined the carcase on Sunday afternoon. They found all the internal organs healthy, and thought the cow must have died from a fit. They had not the slightest doubt that the flesh was fit for human food. One of the veterinary surgeons (we forbear to mention his name) said the lungs 'were not in the least en-

larged, but, on the contrary, were quite natural in appearance'. When pressed to say what the cow had died of, since he was quite sure there was no inflammation of the lungs, he answered, '*It might have died from having too much blood in it.*' The defendant's assistant was also called, and added his testimony as to the good quality of the beef and its fitness for human food. After a brief consultation, the bench inflicted a penalty of £10 and costs. A good deal more time than was necessary appears to have been taken up in the hearing of this case. When an animal is found dead, without marks of external violence, the reasonable presumption is that it died of some disease; and the carcase, under these circumstances, is, in the opinion of all competent authorities, unfit for food of man. A butcher purchasing such a carcase, bringing it to his slaughter-house, and dressing it as for human food, is clearly guilty of a breach of the law, and liable to fine or imprisonment under the 117th section of the Public Health Act. The precise cause of death is really scarcely worth inquiring about. In this particular case there appears to be little doubt the cow died from inflammation of the lungs, probably complicated with emphysema; but supposing it had died from having 'too much blood' (whatever that may mean), the carcase would still be just as unfit for food, and preparing it for the meat market just as grave an offence.

THE CRAVEN COMBINED SANITARY DISTRICT.

The 'special' reports of Dr. Barry, the Medical Officer of Health for the Craven Combined Sanitary District, are of a type that we should like to see adopted by all officers of his class. Dr. Barry seems to have taken as his model the reports of the medical inspectors of the Local Government Board, and certainly he could have adopted no better. In fact, if all medical officers of health followed Dr. Barry's example, there would be small occasion for those inspections into the actual sanitary condition of places that now take up so much of the time of the inspectors of the central office, and debar them from making those general inquiries into the causation and incidence of disease which should be their chief employment. Three of Dr. Barry's recently presented reports on particular places now lie before us —reports on the Sanitary condition of the Silsden Urban Sanitary District, of the village of Sutton in the Keighley rural district, and of the village of Barnoldswick in the Skipton rural district. All three present the same features, exact information being given as to the locality, area, population, elevation, geology, industries, streets, dwellings, sewerage and drainage, means of excrement and refuse disposal, water supply, trades nuisances, and general sanitary administration, together with a review of the mortality statistics of each place for a very extended period. Dr. Barry's recommendations in all these instances seem to us to be most wise and practical, and we trust that they will be carried out without delay. No praise is too strong for reports such as these. They afford an admirable starting-point for sanitary action, and they enable the progress made year by year to be accurately judged. A sanitary survey such as that upon which Dr. Barry is engaged seems to us to be an indispensable preliminary to efficient sanitary action of the steady and systematic kind that is so much to be encouraged. Dr. Barry is evidently working *con amore* in his district; and energy such as his cannot fail to be contagious, and infect even Yorkshire local sanitary authorities, who have very much to answer for in the way of sanitary neglect.

RETURNS TO MEDICAL OFFICERS OF HEALTH.

We have frequently had occasion to note the absence from the Annual Reports of Medical Officers of Health of any particulars as to the pauper sickness in their district. Often, perhaps, this has been because the local sanitary authority had not made arrangements with the poor-law guardians for this information to be supplied; but we cannot doubt that in other cases the omission has arisen from the impossibility of making head or tail of the returns. (Compare on this subject Dr. Cornelius Fox, in vol. vii, p. 405.) It is clearly desirable, however, that the medical officer of health should have the facts as to pauper sickness sent to him, whether he publishes them or not, because they are valuable not only as an index to the prevalence of non-fatal disease among all classses in the district, but as giving him occasion to exercise useful and immediate sanitary supervision over localities which are most apt to require such supervision. We are glad, therefore, to find that the Local Government Board have issued a circular, again urging upon local authorities to make arrangements, where they have not already done so, for securing this information to the medical officer of health. The Board also advert to the necessity of the medical officer receiving weekly returns of deaths from the registrars, and immediate notice of all deaths from infectious disease; but this is too self-evident a requirement to need discussion.

HOSPITAL ACCOMMODATION AT ST. ALBAN'S.

There seems to be some misconception on the part of the St. Alban's Guardians with regard to a proposal made by the Local Government Board, in which we entirely concur, that the Rural and Urban Sanitary Authorities should combine for the provision of a joint infectious hospital, and that the Guardians should send cases to this hospital, on terms of payment to be agreed upon. In this manner, the necessity of each Authority providing a separate hospital, with a separate staff of officers, would be obviated, and greater economy of administration would be secured. The Town Council are willing to join in this combination, but the Guardians, for some reason, seem to hang back. We see nothing objectionable in the arrangement, which is now in force in many districts in different parts of the country. On the contrary, it seems to us to have very much to commend it, and we trust that the Guardians (who have now no provision whatever for the isolation of infectious cases) will, on reconsideration, decide to adopt it.

DISEASE AND SANITARY DEFECTS.

In a recent report to the Workington Local Board, Dr. Ward makes the following remarks:— 'It is interesting to observe how disease, other than zymotic, seems to bear an intimate relationship to defective sanitary conditions, diseases of a so-called constitutional and local character; and in many instances coming under these general heads which I have investigated, sanitary defects have been observable. A drain underneath a house, together with a foul choked water-closet in an enclosed back yard, associated with a fatal bronchial affection in a child; a case of pulmonary consumption in a young person, asso-

ciated with a defective pointing, etc., at the gable end of a house, which permitted the damp to appear but too manifest in the corner of the room near to which the sick one's bed was placed and where she died; a case of inflammation of the lungs proving fatal, in a stuffy, damp corner of a small room on the ground floor, the air of which—totally inadequate as to cubic volume—was rendered more stagnant by the presence of bed curtains; succeeding to this, and occupying the same bed, in the same very objectionable and dangerous situation, a case of confinement, speedily manifesting symptoms allied to those of puerperal fever, and it would appear—speaking after the manner of men—only averted by removing the patient to a drier and more airy room up stairs; another case of inflammation of the lungs, a disease often associated with causes allied to those of typhoid fever, in a house the bedroom of which was destitute of permanent ventilation—close and stuffy—the indoors or house atmosphere, moreover, further vitiated by the presence of a gully grating placed inside the house to carry off the leakage from a water tap. If such provision is requisite, at least the same precautions should be taken to isolate the house atmosphere from the sewer as is seen to in the instance of the slop-stone waste-pipe, which is conveyed immediately through the outer wall, to discharge over a trapped yard gully, or channel leading thereto—the gully should be placed outside the house, and a channel or pipe, from which it is disconnected, should but lead thereto. To the above instances might be added a case of fatal inflammation of the windpipe, in a child, where special provision seems to have been taken to reduce house ventilation to a minimum; cases of tubercular inflammation or other diseases of the brain, in children especially, closely, as it would seem, connected with deficiency of fresh air in the dwelling; together with cases of defective nutrition and wasting in infants, pointing, as their very designation would imply, to the withholding of their natural sustenance—the breast, that element which alone is capable of sustaining physical life and growth indefinitely. I might instance many other diseases, some even of a supposed organic nature, as of the kidneys, together with intractable affections of the skin, manifesting marked improvement or entirely disappearing when removed from the influence of defective sanitary surroundings.

THE PUBLIC HEALTH

IN THE FIVE WEEKS ENDING 1ST NOV., 1879.

THE condition of the public health, judged by the Registrar General's mortality statistics, although scarcely so favourable as it had been during July, August, and September, continued generally satisfactory during October.

In twenty of the largest English towns, containing nearly a third of the entire population of England and Wales, 26,561 births and 14,777 deaths were registered during the five weeks ending 1st November. The births were equal to an annual rate of 37.5 per 1,000 persons estimated to be living in those towns, against 37.1 in the corresponding five weeks of 1878. The deaths in October were equal to an annual rate of 20.9 per 1,000 of the nearly seven and a-half millions of persons estimated to be living in the twenty towns, against 17.7, 18.4, and 19.0 per 1,000 respectively in July, August, and September, respectively. The death-rate in these twenty towns during October 1877 and 1878 averaged 21.5 and 21.3 per 1000. The death-rate during last month was therefore below the average, although exceeding the low rates prevailing in the three preceding months. The lowest annual rate of mortality during October in the twenty large towns was 14.8 per 1000 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follows:—Wolverhampton, 15.8; Bristol, 17.1; Leicester, 17.9; Brighton, 18.2; Birmingham, 18.9; Oldham, 19.0; Plymouth, 19.1; Leeds, 19.8; Nottingham, 19.8; Newcastle-upon-Tyne, 19.8; Sunderland, 20.5; Sheffield, 20.7; Bradford, 20.7; London, 20.9; Hull, 21.3; Norwich, 21.6; Salford, 23.7; Manchester, 24.4; and the highest rate during the month 25.8 in the borough of Liverpool. The average death-rate in the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, was equal to 20.9 per 1,000, and corresponded with the rate in the metropolis. The excessive rate in Liverpool was in great measure due to excessive zymotic fatality; the high rates in Salford and Manchester do not appear to be due to this cause.

The 14,777 deaths from all causes in the twenty towns included 2,349 which were referred to the seven principal zymotic diseases, against 2,380 in the corresponding period of last year; 778 resulted from scarlet fever, 596 from diarrhœa, 326 from measles, 281 from whooping-cough, 260 from fever (principally enteric), 96 from diphtheria, and 12 from small-pox. Compared with the number recorded in the five weeks of October 1878, the fatal cases of diarrhœa and measles showed an increase, whereas those of each of the five other zymotic diseases were less numerous. The largest increase occurred in the deaths from measles, which were 326 in the five weeks under notice, against 123 in the corresponding period of last year. The 260 deaths referred to fever (including typhus, enteric or typhoid, and simple) were 135 fewer than those returned in October 1878, affording evidence of improving sanitary condition. The 2,349 deaths returned from these seven diseases during the five weeks of October were equal to an annual rate of 3.3 per 1,000 persons estimated to be living in the twenty towns, against 3.4 in the corresponding period of 1878. The zymotic death-rate during last month did not exceed 0.8 in Wolverhampton, 1.2 in Portsmouth, and 1.9 both in Bristol and Oldham; it ranged upwards in the other towns to 4.0 in Sheffield, 4.7 in Newcastle-upon-Tyne, and 5.4 in Liverpool. Scarlet fever generally shows increased fatality during the autumn, and this year forms no exception to the rule; the weekly deaths from scarlet fever in these twenty towns, which had averaged 103 and 115 in August and September, rose to 156 in October. The largest proportional fatality of scarlet fever in the twenty towns occurred in Sunderland, Newcastle-upon-Tyne, and Liverpool. The fatal cases of measles also showed a considerable increase during October, especially in Leeds, Liverpool, and London. Diarrhœa was more fatal last month than in the corresponding period of last year, both in London and the provincial towns; the weekly deaths, however, declined from 152 in the first, to 76 in the last, of the five weeks under notice. Whooping-cough was less fatal in October than it had been in any preceding month of the year. The 96 deaths referred to diphtheria included 64 in London, whereas but 32 were registered in the nineteen provincial towns. Of the 360 deaths from fever, principally enteric, 160 were recorded in London, and 100 in the nineteen other towns; the fatality of fever was therefore considerably greater in the metropolis than in the aggregate of the provincial towns. Fever mortality in October showed a general increase upon that recorded in the two preceding months, although it was considerably below the average for the season. The 12 fatal cases of small-pox included 11 in London, and but one in the nineteen provincial towns; the latter case was recorded in Birmingham. The prevalence of small-pox in London, judged from the returns from the Metropolitan asylum hospitals, continued to decline during October; the number of small pox patients in these hospitals, which was 56 on the 27th of September, had declined to 37 on the 1st inst., although 39 new cases were admitted during that period.

The increase in the general death-rate during October was mainly due to the greater fatality of diseases of the respiratory organs, not including phthisis. It appears from the Metropolitan returns that the weekly number of deaths

referred to these diseases in London, which had averaged 159 and 168 during August and September, rose to 301 in October, and were equal to an annual rate of 4.3 per 1,000 of the estimated population. The deaths referred to phthisis in London were 763, against 549 in September, and were equal to an annual rate of 2.2. The rate of mortality from diseases of the respiratory organs and phthisis was equal to 6.5 per 1,000 in London; in Liverpool the rate from these diseases was equal to 7.3, and in Salford to 7.6 per 1,000.

In the outer ring of suburban districts round London (having a population estimated at little short of 1,000,000 persons) the annual death-rate from all causes during October did not exceed 14.7, and the zymotic rate was but 1.9 per 1,000. These rates in inner or registration London being, as before stated, 20.9 and 3.2 per 1,000 respectively.

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Five Weeks ending Nov. 1st, 1879.				
		Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000.	
					All Causes.	7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns . .	7,383,999	26,561	14,777	2349	20.9	3.3
19 Provincial Towns .	3,763,131	134,24	7,542	1222	20.9	3.4
London (Reg. Gen.) .	3,620,868	13,137	7,245	1127	20.9	3.2
Brighton (borough) . .	105,608	332	184	22	18.2	2.2
Portsmouth (borough) .	131,821	418	187	15	14.8	1.2
Norwich (borough) . .	85,222	304	176	26	21.6	3.2
Plymouth (borough). .	74,303	201	136	15	19.1	2.1
Bristol (city) . . .	209,947	733	345	39	17.1	1.9
Wolverhampton (borough)	75,100	284	114	6	15.8	0.8
Birmingham (borough) .	388,884	1,537	706	123	18.9	3.3
Leicester (borough) . .	125,622	476	216	37	17.9	3.1
Nottingham (borough) .	169,396	562	321	39	19.8	2.4
Liverpool (borough) .	538,338	2,086	1,330	277	25.8	5.4
Manchester (city) . .	361,819	1,239	846	117	24.4	3.4
Salford (borough) . .	177,849	660	404	62	23.7	3.6
Oldham (borough) . .	111,318	370	203	20	19.0	1.9
Bradford (borough) . .	191,046	697	378	61	20 7	3.3
Leeds (borough) . .	311,860	1,121	593	98	19.8	3 3
Sheffield (borough) . .	297,138	1,060	590	115	20.7	4.0
Hull (borough) . .	146,347	525	299	41	21.3	2.9
Sunderland (borough) .	114,575	383	225	43	20.5	3.9
Newcastle-upon-Tyne (borough) . . .	146,948	526	279	66	19.8	4-7

HEALTH OF OTHER URBAN SANITARY DISTRICTS IN OCTOBER.

It is very satisfactory to be able to report a further considerable accession to the number of medical officers of health who have expressed their willingness to co-operate in our effort to publish in these columns *uniform* monthly vital statistics for as many as possible of the principal urban sanitary districts of England and Wales. In an accompanying table will be found such statistics for 104 of these districts for the month of October. In the months of July, August, and September the number of contributing medical officers of health did not exceed 36, 55, and 67 respectively. The estimated population of these 104 urban sanitary districts, situated in various parts of England and Wales, is little short of 3,000,000 of persons.

On the last day of October pre-paid post cards for the necessary information relating to that month were addressed to 190 medical officers of health, 67 of whom had contributed information for previous months. The result of these 190 applications has been that we are enabled to publish the desired statistics for the 104 districts included in the table; 63 are returns from previous contributors, and 41 from medical officers of health, who now co-operate for the first time. We have also received numerous promises of future assistance from other medical officers of health, whose present arrangements did not admit of their contributing the facts for October. We have therefore good ground for anticipating further considerable assistance from month to month. Only 4 of the 67 medical officers of health who contributed statistics for September failed to return their cards for October in time for insertion in the table. Accompanying the cards addressed to the 123 other medical officers of health invited to contribute was sent a circular requesting the return of the card, with a word or two of explanation in case of inability to assist in this undertaking. It is eminently satisfactory that only 5 of these 123 medical officers of health have thus notified their inability to assist. Up to the time of going to press, however, 77 of the post-cards had not been returned, or any reply to the circular received. We may therefore still hope for assistance from a certain proportion of these 77 sanitary districts.

The annual birth-rate in 99 of the 104 sanitary districts appearing in our list for October averaged 35.9 per 1,000, against 34.0 and 34.6 in August and September. The average birth-rate in October in the 20 largest English towns was equal to 37.5. It will be seen that five of the contributing medical officers of health were unable to supply the number of births in their districts. It may be hoped that in order to secure uniformity it may be found possible to supply this omission in future. The number of births registered constitutes an important element in the vital statistics of urban sanitary districts, as supplying the most satisfactory means for measuring infant mortality.

The annual death-rate in the 104 sanitary districts averaged 17.7 per 1,000, and was 3.2 below the average rate in the 20 larger towns. The death-rates in most of these sanitary districts showed a marked increase upon those that prevailed during August and September. The annual rates during last month were remarkably low, and below 10 per 1,000 in Bridgnorth, Cheltenham, Coseley, Littlehampton, Pembroke, and Penzance. The following excessive rates of mortality may be noted:—Ashton-under-Lyne, 27.1; Bridport, 34.6; Gorton, 27.1; Hinckley, 26.8; Maidenhead, 35.1; Preston, 29.5; and Wigan, 26.4. Excess of zymotic fatality accounted for most of these high general death-rates.

The annual death-rate from the seven principal zymotic diseases in the 104 districts averaged 2.6 per 1,000 in October, against 3.3 in the 20 larger towns. No death from these diseases was returned in Abingdon, Coventry, Ilfracombe, Leek, Littlehampton, Lytham, Neath, Newbury, Skipton, Tredegar, or Truro. Among the highest zymotic death rates last month may be noted:—Bridport, 10.3 (measles); Hinckley, 14.9 (scarlet fever); Maidenhead, 7.3; Peterborough, 9.8 (scarlet fever); Redditch, 5.4; Swansea, 6.3 (enteric fever); and Wigan, 6 6. No death from small-pox was registered in any of the 104 town districts. Measles showed fatal prevalence in Bath, Bolton, Bridport, and Devonport; scarlet fever in Barnsley, Derby, Hinckley, Middlesborough, Peterborough, Swansea, West Derby, and Wigan. If we except Swansea, the deaths referred to fever (principally enteric) in the 104 town-districts were satisfactorily few. The epidemic of enteric fever in Swansea caused 19 more deaths during October, against 27 and 30 in August and September; during the first six months of this year, only 6 deaths were referred to fever within the borough.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 3.2 per 1000 in the 104 urban sanitary districts. The rate from these diseases, in the 67 contributing districts, did not exceed 2.2 per 1000 in August and September. The fatality of lung diseases during October showed a marked excess in Ashton-under-Lyne, Glossop, Luton, Over Darwen, Preston, and Stalybridge.

Infant mortality, measured by the proportion of deaths under one year to births registered, averaged 134 per 1,000 in the 104 sanitary districts, against 155 in the twenty larger towns. Disregarding some of the districts which are too small for the calculation of monthly rates useful for comparative purposes, the lowest rates of infant mortality occurred in Barrow-in-Furness, Dover, and Widnes; while the rate showed showed a marked excess in Ashton-under-

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF OCTOBER 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1000 persons living				Deaths under one year of age to 1,000 births	Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs		
Abingdon	6,007	10	9	5	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	19.6	17.6	0.0	0.0	500	W. T. G. Woodforde, M.D.
Accrington	30,000	85	28	10	4	..	2	8	4	1	..	..	..	..	..	..	1	6	6	..	..	33.4	11.0	0.4	2.4	118	J. Ewart.
Altrincham	11,000	33	11	2	2	..	1	3	3	1	..	..	1	..	..	..	..	..	1	1	..	35.3	11.8	1.1	2.1	61	G. H. Attwell.
Ashton-under-Lyne	33,417	91	77	22	7	3	4	21	20	3	..	1	..	..	..	..	2	16	8	..	10	32.1	27.1	1.1	5.6	242	W. H. Hughes.
Aston Manor	51,408	186	60	18	11	5	3	15	8	11	..	..	6	1	..	..	4	16	3	3	..	42.6	13.7	2.5	3.7	97	H. May.
Bangor	7,820	*	8	2	2	..	..	1	3	1	..	..	1	..	..	..	..	..	..	..	..	*	12.0	1.5	0.0	*	H. Rees.
Barnsley	30,000	100	55	13	12	6	2	11	11	12	..	1	8	..	..	1	2	8	6	2	8	39.2	21.6	4.7	3.1	130	M. T. Sadler.
Barrow-in-Furness	37,500	139	45	7	14	5	3	10	6	7	..	..	3	..	1	2	1	4	4	4	..	43.6	14.1	2.2	1.3	50	J. Lettle.
Bath	53,432	114	81	*	*	3	3	15	39	7	..	6	..	..	..	..	1	8	13	4	9	27.8	19.8	1.7	2.0	*	A. B. Brabazon, M.D.
Batley	28,721	80	58	19	10	2	2	9	16	8	..	..	2	..	..	2	3	12	3	..	..	32.8	23.8	3.3	4.9	238	W. Bayldon.
Belper	10,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. G. Allen.
Bilston	24,188	*	24	7	3	1	1	5	7	2	..	1	1	..	..	..	..	..	..	..	..	*	..	..	..	*	W. M. Hancox.
Bingley	9,000	24	19	3	4	4	1	4	3	3	..	..	2	..	..	..	1	2	4	..	..	31.4	24.9	3.9	2.6	125	J. W. Craig, M.D.
Bolton	105,000	256	141	48	24	14	5	28	22	31	..	10	2	..	4	5	10	21	9	4	..	31.8	17.5	3.8	2.6	188	E. Sergeant.
Bootle-cum-Linacre	25,500	95	45	13	16	4	1	8	3	11	..	..	..	2	..	1	3	10	3	3	..	43.9	20.8	5.1	4.6	137	R. J. Sprakeling.
Bridgnorth	6,000	13	4	2	..	..	..	1	1	1	..	..	..	..	..	..	1	..	..	..	..	25.5	7.8	2.0	0.0	154	A. Mathias.
Bridport	8,138	23	27	6	8	..	..	6	7	8	..	8	..	..	..	..	..	4	2	..	1	29.5	34.6	10.3	5.1	261	G. M. Evans.
Bromsgrove	6,967	24	12	4	..	1	1	1	5	1	..	..	..	..	..	..	1	3	1	..	..	40.5	20.3	1.7	5.1	167	C. Carey.
Burslem	28,763	78	30	15	5	2	..	6	2	5	..	..	1	..	..	..	4	7	1	1	..	31.9	12.3	2.0	2.9	192	J. M. Taylor.
Bury St. Edmunds	15,000	37	16	2	2	..	..	6	6	1	..	..	..	..	1	..	..	1	2	..	2	27.9	12.1	0.8	0.8	54	F. W. Clarke.
Cambridge	34,000	81	47	10	3	3	1	1	17	1	..	..	1	..	..	..	..	7	5	4	5	28.0	16.3	0.4	2.4	123	B. Anningson, M.D.
Canterbury	20,962	65	19	5	..	1	1	7	5	2	..	1	..	..	..	..	1	6	6	1	2	36.5	10.7	1.1	3.4	77	F. Wacher.
Cardiff	80,150	279	79	26	7	2	2	25	17	9	..	1	1	..	..	..	5	19	9	4	11	41.0	11.6	1.3	2.8	93	H. J. Paine, M.D.
Carnarvon	10,299	27	12	..	2	1	..	5	4	1	..	..	..	1	..	..	..	1	3	..	..	30.9	13.7	1.1	1.1	..	H. Rees.
Cheltenham	45,000	125	35	6	3	..	1	10	13	2	..	..	..	..	..	..	2	4	3	1	4	29.0	8.1	0.5	0.9	48	T. Wright, M.D.
Colchester	28,633	83	35	9	6	1	1	6	12	2	..	..	1	..	..	1	..	4	5	..	3	34.1	14.4	0.8	1.6	108	E. Waylen.
Congleton	12,000	36	14	2	2	..	1	2	7	3	..	2	..	..	..	..	1	..	2	..	..	35.3	13.7	2 9	0.0	56	P. M. Davidson.
Coseley	23,000	55	19	7	3	..	1	*	*	3	..	..	..	..	..	..	3	2	1	..	..	28.2	9.7	1.5	1.0	127	J. Eagleton.
Coventry	41,000	149	56	20	6	2	..	14	14	..	..	..	..	..	..	..	..	8	5	..	4	37.9	14.2	0.0	2.0	134	M. A. Fenton, M.D.
Croydon	69,500	193	79	20	16	3	2	24	15	6	..	..	..	..	..	1	4	19	6	..	15	32.7	13.4	1.0	3.2	104	C. W. Philpot, M.D.
Derby	80,385	246	143	25	28	*	*	*	28	33	..	..	25	1	3	2	2	18	9	6	11	39.9	23.2	5.4	2.9	102	W. Iliffe.
Devonport	50,000	*	77	18	17	6	1	17	18	18	..	15	1	1	..	1	..	12	5	..	4	*	16.1	3.8	2.5	*	J. May, jun.
Dover	33,028	97	48	4	9	7	3	11	14	8	..	6	1	..	..	1	..	5	4	3	11	34.6	17.1	2.9	1.8	41	M. K. Robinson, M.D.
Eastbourne	18,000	*	23	1	8	3	1	3	7	7	..	..	6	..	..	..	1	..	3	..	3	*	15.0	4.6	0.0	*	E. F. Fussell, M.B.
East Dereham	5,762	21	8	1	..	..	1	3	3	1	..	..	..	..	..	..	1	1	1	..	..	42.9	16.4	2.0	2.0	48	H. B. Vincent.
Fenton	13,000	44	26	6	8	3	2	3	4	8	..	..	6	..	..	2	..	4	2	..	..	39.9	23.5	7.2	3.6	136	A. V. Griffiths.
Glossop	17,072	43	38	10	16	3	..	9	..	8	..	5	..	..	2	1	..	12	4	..	4	30.6	27.1	5.7	8.6	233	J. Rhodes.
Gorton	30,000	121	73	26	22	4	3	10	8	18	..	..	6	..	..	1	11	13	4	..	..	42.1	25.4	6.3	4.5	215	R. E. Hammond.
Guildford	9,996	25	11	2	2	..	..	3	4	1	..	..	..	1	..	..	..	..	2	..	..	29.4	13.0	1.2	0.0	80	J. Morton.
Halifax	71,500	198	128	30	21	*	*	22	*	14	..	..	10	1	..	2	1	25	9	6	16	36.1	23.3	2.6	4.6	152	D. Ainley.
Hinckley	7,000	40	18	2	10	1	..	1	4	10	..	..	10	..	..	..	..	2	..	..	1	59.6	26.8	14.9	3.0	50	W. H. Griffiths.
Hindley	19,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Huddersfield	80,245	252	129	37	17	12	16	26	21	13	..	1	5	..	1	2	4	20	22	5	13	32.7	16.8	1.7	2.6	147	J. S. Cameron.
Ilfracombe	5,300	10	6	..	..	..	..	4	2	..	..	..	..	..	..	..	..	..	1	..	..	22.2	13.3	0.0	0.0	..	E. J. Slade-King, M.D.
Ilkeston	13,957	47	19	11	2	1	1	..	4	2	..	..	..	..	..	..	2	6	1	..	..	50.8	20.5	2.2	6.5	234	R. Wood.

LUTON	23,000	77	34	7	8	3	4	6	6	3	..	..	..	..	..	2	1	18	10	1	3	38.2	16.8	1.5	8.9	91	H. Sworder.
LYTHAM	5,000	4	6	..	..	..	..	3	3	..	..	..	..	..	..	..	..	1	..	..	..	8.4	12.5	0.0	2.1	..	W. E. Pountney, M.B.
MAIDENHEAD	8,052	26	24	4	5	..	1	6	8	5	..	3	..	..	1	..	1	1	3	1	4	38.0	35.1	7.3	1.5	154	W. T. G. Woodforde, M.D.
MAIDSTONE	29,148	73	44	12	3	2	1	14	12	3	..	..	..	..	2	..	1	5	7	3	2	32.6	19.7	1.3	2.2	164	M. A. Adams.
MERTHYR TYDFIL	50,350	123	66	14	8	5	5	21	13	2	..	..	..	..	1	..	1	13	8	3	4	27.9	15.0	0.5	2.9	114	T. J. Dyke.
MIDDLESBOROUGH	53,580	167	71	19	14	9	2	18	9	15	..	..	12	1	..	2	..	10	8	2	5	36.7	15.6	3.3	2.2	114	J. A. Malcolmson, M.D.
MIDDLETON TONGE	16,550	42	31	11	4	1	3	7	5	1	..	1	..	..	..	..	..	7	3	1	..	29 9	22.0	0.7	5 0	262	T. B. Knott.
MORLEY	11,546	38	15	7	3	1	..	..	4	3	..	..	2	..	..	..	1	2	..	..	..	42.9	16.9	3.4	2.3	184	S. T. Steele.
NEATH	12,000	26	11	1	3	..	1	2	4	..	..	..	..	..	..	..	..	1	..	1	2	25.5	10.8	0.0	1.0	38	G. Ryding, M.D.
NEWARK	13,426	39	18	6	4	..	1	3	4	2	..	..	1	..	..	1	..	6	..	..	..	30.3	14.0	1.6	4.7	154	A. Ashby, M.B.
NEWBURY	8,037	25	13	..	..	1	..	4	8	..	..	..	..	..	..	..	..	1	1	..	2	36.3	18.9	0.0	1.5	..	W. T. G. Woodforde, M.D.
NEWCASTLE-UNDER-LYME	18,000	67	19	5	..	..	1	7	6	1	..	..	..	..	..	..	1	2	1	..	..	43.8	12.4	0.7	1.3	75	St. G. Edwards, M.D.
OAKWORTH	5,800	22	12	3	2	..	..	1	6	2	..	2	..	..	..	..	..	2	..	..	..	44.6	24.3	4.1	4.1	136	F. W. Barry, M.D.
OLDHAM	111,318	370	203	65	42	12	14	42	28	23	..	..	6	1	9	2	5	64	16	2	10	34.7	19.0	2.2	6.0	176	J. M. Sutton, M.D.
OVER DARWEN	27,000	109	51	30	3	2	2	11	3	4	..	..	2	..	..	..	2	23	1	..	..	47.5	22.2	1.7	10.0	275	W. H. Armitage.
PEMBROKE	15,000	36	9	3	1	1	1	2	1	1	..	..	..	..	..	..	1	1	..	2	..	28.3	7.1	0.8	0.8	83	D. P. Saer.
PENZANCE	11,000	32	9	3	4	..	..	..	2	2	..	..	1	..	1	..	..	1	..	..	..	34.3	9.6	2.1	1.1	94	J. Symons (Deputy).
PETERBOROUGH	20,000	59	31	5	12	2	1	5	6	15	..	..	13	2	..	..	..	4	3	1	..	38.5	20.2	9.8	2.6	85	W. Thomson, M.D.
POOLE	11,361	37	16	3	2	1	1	3	6	2	..	2	..	..	..	..	..	1	2	..	1	38.3	16.6	2.1	1.0	81	H. A. Lawton.
PRESTON	87,600	290	198	67	55	14	13	23	26	31	..	5	10	2	..	3	11	53	12	3	4	43.2	29.5	4.6	7.9	231	H. O. Pilkington.
RAMSGATE	25,000	76	41	9	1	1	8	10	12	3	..	..	..	..	..	2	1	8	4	4	..	35.8	19.3	1.4	3.8	118	J. W. Barry.
READING	40,000	112	46	10	7	..	..	18	11	4	..	..	1	..	2	..	1	4	9	1	6	36.5	15.0	1.3	1.3	89	J. Shea, M.D.
REDDITCH	9,686	21	15	2	4	..	..	5	4	4	..	2	..	..	..	..	2	1	3	..	..	28.3	20.2	5.4	1.3	95	H. Page.
REDRUTH	9,500	25	14	2	3	1	1	4	3	2	..	..	2	..	..	..	..	3	2	1	..	31.0	17.3	2.5	3.7	80	J. S. Hichens.
REIGATE	17,700	40	25	3	2	5	1	7	7	5	..	..	5	..	..	..	..	3	1	1	3	26.6	16.6	3.3	2.0	75	E. L. Jacob.
RICHMOND (Surrey)	17,500	42	26	6	2	..	2	10	6	4	..	..	..	1	1	..	2	3	3	1	3	28.3	17.5	2.7	2.0	143	J. T. Rowland, M.D.
ROCHDALE	71,200	201	91	25	21	3	5	24	13	8	..	..	3	1	..	2	..	33	9	1	..	33.2	15.0	1.3	5.5	124	J. Henry, M.D.
ROCHESTER (part of)	12,806	41	22	*	*	2	2	6	2	2	..	2	..	..	..	..	1	5	3	2		37.7	20.2	1.8	0.9	122	J. S. Knight, M.D.
ROTHERHAM	31,631	101	33	*	*	*	*	*	*	7	..	..	2	..	3	1	1	..	..	..	6	41.6	13.6	2.9	0.0	*	J. Hardwicke.
ROWLEY REGIS	27,000	112	45	15	6	1	3	6	10	4	..	1	..	..	..	2	1	4	4	4	..	54.1	21.7	1.9	1.9	134	H. R. Ker.
RUNCORN	14,000	59	18	7	1	1	..	5	4	3	..	..	..	..	..	1	2	1	1	2	..	49.6	15.1	2.5	0.8	119	R. H. Mouritz.
SKIPTON	9,100	26	12	3	1	1	2	5	..	..	..	..	..	..	..	..	..	1	3	1	1	37.2	17.2	0.0	1.4	115	J. W. Barry, M. D.
SMETHWICK	21,000	76	29	13	2	2	1	3	8	4	..	..	3	..	..	..	1	7	1	..	..	42.6	16.3	2.2	3.9	171	H. Sutton.
SOUTH SHIELDS	61,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Spear.
STALYBRIDGE	23,124	62	43	8	5	2	1	18	9	4	..	..	3	..	1	..	..	17	6	3	..	31.6	21.9	2.0	8.7	129	F. J. Roberts Dudley.
SWANSEA	65,000	201	135	31	33	11	11	28	21	35	..	..	15	1	..	19	..	17	7	2	8	36.4	24.5	6.3	3.1	154	E. Davies.
SWINTON	7,428	25	10	3	2	..	..	4	1	1	..	..	..	..	..	..	1	1	..	1	..	43.2	17.5	1.8	1.8	120	C. S. Blythman, M.B.
TAUNTON	16,138	42	21	4	2	..	1	7	7	3	..	..	..	..	..	..	3	3	4	..	6	30.6	15.3	2.2	2.2	95	H. J. Alford, M.D.
TEIGNMOUTH	7,000	30	15	6	1	1	1	2	4	2	..	..	..	..	..	..	2	2	3	..	..	50.4	25.2	3.4	3.4	200	W. C. Lake, M.D.
TIVERTON	10,400	22	11	1	..	..	1	3	6	1	..	..	..	..	1	..	..	..	5	..	1	27.6	13.8	1.3	0.0	46	W. F. Terry.
TORQUAY	25,000	*	27	6	3	1	4	4	9	1	..	..	..	..	1	..	..	6	3	..	..	*	11.3	0.4	2.5	*	P. Q. Karkeek.
TOXTETH PARK	8,000	19	6	1	3	..	..	2	..	..	..	..	..	..	..	..	..	5	..	..	..	28.0	8.8	0.0	7.4	53	R. W. Pendleton.
TREDEGAR	16,000	35	27	4	2	2	1	12	6	..	..	..	..	..	..	..	..	6	3	1	5	25.8	19.9	0.0	4.4	143	G. A. Brown.
TRURO	11,049	24	10	1	2	..	..	3	4	..	..	..	..	..	..	..	..	1	2	..	..	25.6	10.7	0.0	1.1	42	E. Sharp.
TUNSTALL	15,300	49	24	6	4	..	1	8	5	2	..	..	..	..	1	..	1	8	4	..	..	37.7	18 5	1.5	6.2	122	J. P. Edwards.
TYNEMOUTH	43,531	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. Stephens.
WAKEFIELD	32,500	*	45	14	9	4	1	11	6	6	..	..	1	..	..	1	4	10	3	2	7	*	18.1	2.4	4.0	*	W. S. Wade.
WARRINGTON	37,000	126	56	15	9	3	4	13	12	8	..	..	..	..	4	2	2	9	1	4	3	44.4	19.7	2.8	3.2	119	G. W. Joseph.
WEDNESBURY	26,000	62	18	5	2	2	3	3	3	2	..	..	..	..	1	..	1	3	4	1	..	31.1	9.0	1.0	1.5	81	J. C. Garman.
WEST BROMWICH	53,600	203	114	35	29	*	*	*	16	22	..	2	7	..	2	2	9	..	..	..	10	39.5	22.2	4.3	0.0	172	J. Manley.
WEST DERBY	32,263	118	47	9	13	2	3	10	10	14	..	..	10	..	1	1	2	11	4	..	1	43.1	17.2	5.1	4.0	76	W. Carter, M.B.
WIDNES	22,000	102	32	5	14	2	..	5	6	5	..	..	5	..	..	..	..	10	1	1	1	54.6	17.1	2.7	5.4	49	W. Cooper.
WIGAN	45,432	147	92	32	22	*	*	*	3	23	..	..	22	..	..	..	1	22	10	4	10	42.2	26.4	6.6	6.3	218	H. C. Barnish.
WILLENHALL	18,943	51	31	7	8	2	2	6	6	6	..	2	1	..	..	1		3	3	1	..	28.1	17.1	3.3	1.7	137	W. H. Hartill.
WITHINGTON	15,000	25	13	3	..	..	..	4	6	3	..	..	..	..	..	..	3	4	2	..	..	21.7	11.3	2.6	3.5	120	T. C. Railton, M.B.
WORTHING	9,365	20	14	1	2	1	1	7	2	1	..	1	..	..	..	..	..	..	..	5	..	25.2	17.6	1.3	0 0	50	C. Kelly, M.D.
YORK	46,436	149	83	28	11	4	7	21	12	14	..	..	5	..	..	1	8	12	9	3	4	37.8	21.0	3.5	3.0	188	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

Lyne, Batley, Glossop, Gorton, Over Darwen, Preston, and Wigan.

A word or two may not be out of place with reference to the calculated rates published in the accompanying table. In some cases medical officers of health have pointed out what they presumed to be printer's errors in the publication of figures supplied by them for recent months; it is therefore desirable to state that all these rates are invariably recalculated on a uniform system, previously to publication. There is considerable variety in the periods of time embraced by the returns received from the different sanitary districts. Some relate to the calendar month, some to four weeks, and some to five weeks. The system adopted is to reduce the estimated population in the middle of the year (which is the divisor of the births, deaths, etc.,) in proportion to the period dealt with in the return. Thus for a calendar month the divisor is 30 or 31·365ths. of the population; for four weeks 28-365ths. of the population; and for five weeks 35·365ths. of the population. Some medical officers of health, in calculating their rates of mortality, have assumed that a week is the 52nd part of a year, whereas there are (to be precise) 52.17747 weeks in a natural year. This would frequently account for a difference in the decimal place of the published rates. Whenever practicable, the calendar month is preferable, as the period for a monthly return, to a return made up for four or five weeks, as the case may be; because, the return for twelve calendar months will give the facts for the natural year, which can never be precisely made up from any number of weekly returns.

If any Medical Officer of Health, otherwise willing to contribute to our Monthly Table of uniform Mortality Statistics, should find the calculation of the annual rates too troublesome, we shall be glad to receive the bare facts on the transmitted post-cards, and will endeavour to ensure the correct calculation of the annual rates previously to publication.

We again invite the co-operation of any Medical Officer of Health who may be able and willing to contribute to our future monthly tables of uniform mortality statistics, and, on receiving intimation to this effect, shall be glad to send, at the close of each month, prepaid post-cards, on which the desired information may be transmitted with the least possible trouble to Medical Officers of Health.

SPECIAL REPORTS.

REPORT OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

THE first meeting of the Session 1879-80 was held on Friday, October 17, at 1, Adam Street, Adelphi, when the new President (Dr. Bristowe) took the chair. After the minutes of the last meeting were read, a letter from the Metropolitan Board of Works was read, and the enclosed new regulations for cow-sheds (made under the order in Council of July 1879 were laid before the meeting, and commented upon. A letter from the British Temperance League, with a copy of a resolution to the effect that the League regretted that well-known medical men gave testimonials in favour of certain wines and spirits, was also read. Dr. Dudfield (Kensington) then called attention to clauses 15 and 16 of the Poor-Law Act, 1879, which empower the Metropolitan Asylum Board to receive persons suffering from infectious diseases into their hospitals, upon payment being made by the Sanitary Authorities sending the patients, and also authorise them to provide ambulances for the removal of the sick. The matter was referred to the Council on the motion of Dr. Dudfield, which was seconded by Mr. Lovett (St. Giles). Dr. Tripe then, according to notice, read an abstract of the Artizans and Labourers' Dwellings Amendment Act, 1879, which was referred to the Council. He next strongly objected to the action taken by the officers of the Metropolitan Board of Works under the provisions of the order in Council (issued in conformity with the Slaughter-house Act, 1878), in opposing the renewal of licenses, which they are not empowered to do by the Act, and were thus assuming the powers of the Boards and Vestries. He thought, therefore, that these authorities should oppose this proceeding. Some remarks were made by other Medical Officers of Health, when the matter dropped. A letter was next read respecting the annual report of the Society, which was referred to the Council for consideration, and report. The following gentlemen were then proposed for election at the next meeting, viz.: Mr. Waterworth (the Medical Officer of Health for St. George's, Southwark), and Mr. Gwynne (the Medical Officer of Health for Hampstead), as Metropolitan members; also Mr. Conolly (Medical Officer of Health for Tottenham), Mr. Day (Medical Officer of Health for Dorchester, and Mr. Moore (Medical Officer of Health for Petersfield), as extra-Metropolitan members.

Dr. Bristowe then commenced his address by thanking his colleagues for the honour conferred upon him, and, after referring to his early connection with the Society, dwelt upon the great importance of preventive medicine, not only to the physician, but to the surgeon, both of whom often found their efforts insufficient to cure, and had, therefore, to content themselves with patching up mere fragments of humanity, and were necessitated to acknowledge that the prevention of diseases and injuries had higher claims to be regarded as a science than the curative or palliative treatment of diseases or injuries that had already occurred. He acknowledged that he is sceptical as to the value of medical treatment in many diseases, but did not deny that most diseases may be relieved by remedies adapted to the general condition of the patient, and that, therefore, the physician should not sit with folded hands waiting for disease to run its course to recovery or death. Undoubtedly there are many remedies which are almost special remedies for certain diseases, as mercury for certain syphilitic affections, colchicum for gout, digitalis and iron for many diseases of the heart, quinine for ague, and many others, but he believed that many of the nicely proportioned drugs might as well be omitted in the treatment of disease, as many disorders run their allotted course without being affected by remedies. Whilst thus dubious as to the benefit of drugs in the treatment of many diseases, he attached great value to the expectant method when used with due foresight and after full consideration. Thus, proper care would frequently prevent nephritis after scarlet fever, heart disease from rheumatism, fatal syncope from diabetes and Addison's disease. Preventive measures would also frequently lengthen the duration of life, and thus allow death to arise from decay rather than from disease; but it must be admitted that preventive means are unable entirely to counteract diseases which arise from hereditary tendency, such as consumption, insanity and cancer. The only approach to effectual prevention would be by forbidding marriages of persons having a tendency to the same hereditary affections, and he urged upon medical officers of health to assist in teaching the injuriousness of such marriages. He then referred to endemic diseases, which are caused by contamination of water, by peculiarity of soil or locality, such as

ague, goître diarrhœa and dysentery, and perhaps pneumonia, and pointed out the necessity of a medical investigation being made whenever these diseases were prevalent. He instanced the cessation of ague in South London by good drainage, so that it is now never met with there unless imported, whilst at one time it was always endemic in that locality. He next dwelt at some length on the necessity of controlling the passions and desires which so often lead to incurable diseases from syphilis or alcohol, and of warning persons against indulgence in these and other infractions of the laws of health. He especially condemned the action of those men and women who, believing that syphilitic diseases are sent by God, object to the restrictive measures now adopted in many towns in conformity with the laws of the land. He then referred to diseases which are spread by emanations from the lungs or skin, such as small-pox, scarlet fever, and whooping cough, the latter of which is probably the most infectious of all diseases, and to the value of disinfection and isolation in preventing their spread. As regards quarantine, he considered it almost useless, and therefore not necessary to be carried out. The injurious effects of drinking water containing the ova of parasites were fully considered, and the mode in which tape-worm, and especially trichinosis, are spread, was mentioned. The effects on the system by bacteria in the production of erysipelas, pyæmia, puerperal fever, and some other diseases, were pointed out, and the great benefits which have been obtained by an antiseptic treatment of these maladies. The comparative infrequency of phosphorus, lead, and mercurial poisoning amongst persons employed in manufactories where these poisons are used, was dwelt upon, as showing the great value of well-directed preventive measures. The comparative absence of scurvy was also mentioned as another instance of this kind. He then expressed his full conviction that a very large proportion of the organic diseases now met with are caused, either in the persons themselves or their descendants, by syphilis or the abuse of alcohol, and that, therefore, individuals are bound, not only for themselves but their children, to avoid those sources of disease. He next very briefly referred to prevention in surgical diseases, and the necessity for medical officers of health devoting themselves more fully to the most widely-spread preventive measures. He considered they are bound to show not only what they can do, but what they ought to be able to do, if their powers were more extended, and concluded by stating his opinion that the death-rate of a district is not to be taken as the sole or even chief test for showing the results of the efforts of medical officers of health.

Dr. Tripe then moved that the thanks of the Society be given to Dr. Bristowe for his very able and useful address, and Dr. Buchanan seconded, at the same time moving that the address be now printed, which was carried by acclamation. The meeting then adjourned to the third Friday in November.

The poll of the inhabitants of Liverpool in reference to the proposed new water-supply from the River Vyrnwy, in Montgomeryshire, adopted by the Town Council, has resulted in a very large majority of votes in favour of the scheme, the numbers being 21,974 for, and 19,314 against it. The Water Committee will now proceed to take the necessary steps for obtaining Parliamentary powers.

SANITARY INSTITUTE OF GREAT BRITAIN.

PROCEEDINGS AND DISCUSSIONS.

THE (Third) Autumnal Congress and Exhibition has just been held at Croydon, extending—the Congress from the 21st to the 25th Oct., and the Exhibition from the 21st Oct. to the 8th Nov. The first Congress of the Institute, it will be remembered, was held at Leamington, and the second at Stafford, and both achieved an unexpected measure of success. This year Croydon was visited, the proceedings being inaugurated on the 21st ult. by a public luncheon provided in the Public Hall, and presided over by Mr. W. Drummond, Chairman of the Local Board of Health, who welcomed the sanitarians in a very able and felicitous speech. He was supported by a number of gentlemen of influence and position, including Mr. Jas. Watney, jun., the senior Member for East Surrey; Dr. W. B. Richardson, President of the Congress; Dr. Alfred Carpenter, J.P.; F. R. Edridge, Esq., J.P.; Dr. Strong, Hon. Sec. to the Local Committee; Prof. de Chaumont; Dr. Lory Marsh; Dr. Parsons Smith; Dr. Rosser; Sir Antonio Brady; Rev. W. Wilks, Vicar of Shirley; Rev. G. R. Roberts, Chairman of the School Board; Dr. Hetley, J.P.; Jas. Spofford, Esq., Chairman of the Board of Guardians, etc., etc. After luncheon, the company adjourned to the Exhibition, which was held on the site of the Central Station in Katharine Street, courteously placed at the service of the Committee by the Directors of the London, Brighton, and South Coast Railway Company. Mr. Drummond having declared the Exhibition open, the public at once inspected the various exhibits.

THE PRESIDENT'S ADDRESS.

In the evening the Congress assembled at the Public Hall to hear Dr. Richardson deliver the inaugural address, SALUTLAND.

A paper by Dr. NORMAN KERR, 'The Mortality from Alcohol a Preventible Mortality', and another by Dr. RIDGE, 'The Relation of Alcohol to Bad Sanitation', were then read.

In the course of the discussion which followed,

Prof. de CHAUMONT said that he considered that the question of alcohol consumption was one of very great difficulty indeed. When it was announced that they ought to abstain from alcohol entirely, as a rank poison, he confessed he could not go a long way with such an opinion. He was perfectly certain that the great majority of women of all classes in the present day drank a great deal more alcohol than was good for them; but to say that alcohol was entirely injurious in every instance was a proposition which he could hardly assent to. He could not conceive that the whole of mankind should have fallen into such great dietetic errors, for when they looked to other countries, they found alcohol was consumed in the form of wine in considerable quantities, and drunkenness was hardly known in the south of Europe. It was known, perhaps, in the north of France, and in the north of Germany, but not in Italy, not in Spain, not in the south of France. Consequently, they must allow a great deal for climate and for race. He did not think that what might be called a dietetic dose of alcohol had been so extremely injurious; at the same time, he was willing to admit that a man would err much more on the safe side if he abstained altogether than if he exceeded the amount of the dietetic dose. Then alcohol was not

the only thing taken freely by many people, for opium was taken in large quantities, especially amongst certain classes of people. And, again, hydrate of chloral was gradually becoming a curse to a large number of people, although it was introduced to alleviate pain. And he remembered when chloroform was first introduced by Sir Jas. Simpson, the chemists and druggists in Edinburgh drove a very large trade in soda water, into which five, seven, or ten drops of chloroform were introduced, and that was consumed chiefly by the ladies. It had a very stimulating effect, which, however, was evanescent, and produced, perhaps, fewer horrors than alcoholic drinks were apt to do. While insisting upon temperance in every possible way, he thought that moderation was the best rule by which they could improve the condition of the people.

Rev. M. GELDART apprehended that all great reforms must proceed from above, not from below. When the educated and well-to-do classes set good examples, then they might expect to see them followed by the lower classes. He thought that most of the drinking of the large mass of the population took place, as every Monday morning showed to an excessive degree, upon a Sunday; and it was very curious that those excellent institutions, the coffee and cocoa palaces should open upon every day of the week and not upon a Sunday, just the very day when one might suppose they would do most good. He thought they should put their theological prejudices on one side and try to diminish drunkenness on the Sunday instead of driving people to the public-house.

Dr. BALBIRNIE agreed with Dr. de Chaumont that to attempt to eliminate alcohol altogether from actual use was a piece of moral, or, he might say, scientific quixotism. He (Dr. Balbirnie) had brought patients round and got them to become robust by the use of stimulants. The person who took two or three glasses of genuine claret a day would not depart very widely from a physiological standard of living.

Dr. KERR, in reply, said that no one had attempted to impugn his statement that 120,000 people were killed annually in this country by the excessive use of alcohol, and therefore he submitted that the argument he founded upon it was valid.

Dr. RIDGE, in reply, said that when they came down to the question whether a drop or two of alcohol once a day was injurious, it was impossible to prove anything; they had to take the gross aggregate, and it was only in the long run that the results came out; and when they saw that in the long run the mortality and sickness were less where total abstinence was practised, no one could hesitate to admit that the use of alcohol was not conducive to health.

On Wednesday, Oct. 22, a paper by Mr. H. C. BURDETT, on the 'UNHEALTHINESS OF PUBLIC INSTITUTIONS', was read.

Mr. VACHERS paper on 'COMMON LODGING-HOUSE ACCOMMODATION' came next (see page 165).

Thursday, October 23rd, Dr. Richardson in the chair. Address by Captain DOUGLAS GALTON, on 'SANITARY ENGINEERING', was read (see p. 167).

Mr. EASSIE read a paper on 'THE DANGERS OF BAD PLUMBING' (see page 182).

Dr. CARPENTER said the address they had just heard had interested him exceedingly, the more particularly because most of the points which Mr. Eassie had referred to were such as interested him (Dr. Carpenter) 12 or 14 years ago in the town, and which brought down on his unfortunate head the vengeance of the plumbers. He trusted the words which had fallen from so great an authority as Mr. Eassie would go home to the people of Croydon, and would help them to get rid of some of those enormous mischiefs which still existed among them. He (Dr. Carpenter) could bear his testimony most strongly to the number of deaths that had happened through the introduction of foul air into houses in the way Mr. Eassie had mentioned, and he knew in that very town, over and over again, there had been families prostrated by that means. He hoped people would now be led to see that unless they got rid of traps of the kind that were being put down now, and unless they got rid of the bad plumbing, of which there was an enormous amount, they could not expect to be free from disease.

Mr. ROGERS FIELD said he thought it a fatal error to ventilate sewers by carrying pipes up the sides of houses.

Dr. LORY MARSH endorsed what Mr. Eassie had said with respect to bad plumbing, which yielded to the attacks of rats and worms. Having suffered a terrible stench in his own house for some time, he investigated it, and found that rats had been at the pipes. There was no question of the ability of rats to commit damage. At his fireplace the water began to drip down, and he thought the boiler had burst, but an investigation showed that rats had been at the pipe supplied by the cistern.

Mr. ARMSTRONG (Newcastle-on-Tyne) wished to ask Mr. Eassie his opinion as to the proper way to make a joint. Was a solder-joint indispensable, or what was the best form of joint. The plumbers in his town had a very curious notion. None of them were bold enough to say a putty-joint was sufficient, but they had a way of getting over the difficulty by saying that there was red lead amongst the putty, as though the red lead would do away with the possibility of a crack and the ill-effect of a defective joint. It was in the experience of most medical officers of health, like himself, that those putty and red-lead joints were a source of very great danger to life. A month or two ago, in a large institution to which he belonged, there were two sudden deaths from malignant zymotic disease, and an investigation showed that whilst the closet was one of excellent manufacture, it was joined to the pipe by a red-lead and putty joint, which had cracked, so that the closet could be swayed backwards and forwards, and that was near the bedroom where the two cases terminated fatally.

Mr. SYMONS remarked it occurred to him that many of the outside public might be in a little bit of confusion as to the term sewer gas. They were told there must not even be a crack in the soil pipe, otherwise people would die right and left; yet they saw men going down into the drains, walking about through them, and looking as if they rather thrived upon it. He thought it would be as well if someone would explain how it was that sewer-gas was so dreadfully dangerous in the house, but not at all injurious inside the sewers.

Prof. de CHAUMONT observed that there was a very great difference between the gases that came from the sewers at one time and at another, and if a sewer were properly ventilated, it should have little smell. But when they had to deal with gases arising from sewage allowed to remain in sewers, and go through a process of putrefaction, they had a different state of things. If they believed in the specific poison of the disease, it stood to reason that

unless the specific poison was present in the sewage, it could not communicate disease; at the same time, that opinion was not unanimously held in the medical profession. With regard to the health of the sewer men, they were by no means healthy in Paris, as they suffered from ophthalmia, rheumatism, and various forms of disease, including specific disease. As to the health of sewer men in London, they had there to deal with conditions of a totally different kind. We had here sewers well ventilated, sewage well diluted, and there was little or no smell. He would have an opening for ventilation every hundred yards if need be, so that there should be as little difference as possible between the air in the sewer and the air in the street. The proposition that they had no business to let sewer gas into the streets was true in one sense, for if the sewers were properly flushed, there should be no such thing as sewer gas at all.

Mr. VACHER (Birkenhead) said that a very efficient plan of ventilating the sewers, which appeared to have been overlooked by previous speakers, was to ventilate them directly into the chimney shafts of large factories.

Mr. ARMSTRONG thought that was very seldom practicable.

Mr. BOTTLE remarked that it was quite new to him that worms destroyed pipes.

Mr. EASSIE, in reply, said that the perforation of lead by worms was a well-ascertained fact.

Mr. BAILY DENTON'S paper, 'REMARKS ON FOUR POINTS IN SANITARY ENGINEERING BEARING DIRECTLY ON PUBLIC HEALTH', was then read (see page 173).

In the course of the discussion which followed,

Mr. ROGERS FIELD maintained that they should not ventilate the public sewers. It had long been considered that the whole of the London sewer gas was finding its way up to Hampstead, and there had been a great outcry in consequence, that ventilation should be by shafts, and a short time ago a resolution was passed by the Vestry that a shaft should be erected at the very highest point at Hampstead, which was close to 'Jack Straw's Castle'. Of course it was erected with the idea that a tremendous amount of sewer gas would go up that shaft but the surveyor had stated that, so far from the gas coming out, fresh air went in at the top and forced it down. It seemed to him, therefore, that if they only had their openings sufficiently numerous, they would have air going up one shaft and down another, and they could thus keep their sewers clean.

A gentleman asked how that would be affected by barometrical pressure, to which Mr. FIELD replied that he did not understand the question. He only gave the fact.

Mr. DENTON, in reply, insisted on the necessity of there being some authoritative body to express decision when scientific men differed. It had been said that a scientific body such as he suggested would stop further inquiry, but he could not agree with that view. He had ventured to condemn high shafts, and they had heard from Mr. Field that a high shaft intended to let gas out at Hampstead let air in instead. The proposition he had enunciated in his paper went only to this extent, that the ventilation of sewers should be frequent and at different elevations. He considered that to produce perfect ventilation, they must have outlets at different heights.

Major-General SCOTT'S paper on the 'IMPROVEMENT OF SEWAGE IRRIGATION' was then read.

Mr. SELLAR (Blackheath) thought it had generally been accepted as a fact, but he did not think it ought to be, that sewage treatment would never pay. The sale of the deposit from sewage treatment might go a long way towards paying the expenses of its treatment, and that there was a ready market for it was shown by a letter which he had received from the manager of the Aylesbury Sewage Works, in which he said that he had orders on hand for as much as he could supply up till the end of April. One fact was worth a deal of theory, and if they really had at their doors a valuable property in their sewage which could be extracted in a way which gave no offence to neighbours, and which had that fertilising property which would induce people to buy it at a high price, then they had a factor which would not only materially help to solve the sanitary aspect of the sewage question, but would also be of great profit to agriculture. He did not exaggerate in the least when he said that the stuff possessed very high value indeed, and he would recommend anyone who doubted it to go down to Aylesbury and inspect the sewage operations there. The whole sewage of Aylesbury was treated day and night, and yielded a pure effluent water, in which he had seen hundreds of thousands of fish, and there was neither offence nor noxious vapours. The manure was then preserved and sent to the vineyards of France and the pasture lands of England.

The CHAIRMAN, in moving a vote of thanks to Major-General Scott, remarked that, to make a sewage farm pay, it was of course the very best thing to separate the street water from the sewage, but there might be conditions or towns in which it would be undesirable to pour the street water into the rivers, and he did not think they ought to be led away by the idea of making a sewage farm pay from the question of keeping their sewage pure.

Capt. LIERNUR'S paper on 'THE DOUBLE CONDUIT SYSTEM' was read.

Mr. STURGE considered that Capt. Liernur had shown an utter want of knowledge of Shone's system. Capt. Liernur seemed to think that in Shone's system there was an injector attached to every house, but that was not so. The injectors in Shone's system corresponded to the tanks in Liernur's system.

Mr. DALLAS observed that Capt. Liernur's system only dealt with the excreta and the slops, leaving everything else to go into the river. He ventured to say that such a system would not do in England. The great cost of the system was in itself enough to condemn it.

Dr. PARSONS SMITH'S paper on 'THE NECESSITY FOR A MORE PERFECT SYSTEM OF REGISTRATION OF HOUSE DRAINS' was then read. The conclusions arrived at were that the health of a house depends on the drains being pure; they must, from the nature of things, be hidden from sight; they will at some time or other require to be opened, therefore there should be a permanent record of their position, corrected at any time of change or alteration. The machinery for this is at hand. The plan, to be effectual, must be compulsory. It is that the local authority, vestry, or board provide and keep up a permanent register of all drains, pipes, and channels of communication between a building and the sewer into which it drains. When the district surveyor approves the plan of a new building, he should append his signature to it, and this plan should then be inserted into a book, with a proper index, and retained for reference in the office of the local authority. Half-a-

dozen lithographed copies of this official plan should be handed to the owner of the property, and he should be required to affix one of these copies to the lease, agreement, or whatever form of document conveyed possession of the building to another. By this means the owner of a house could at any time subsequent to the erection ascertain without difficulty the exact position of the drains, and know precisely where to direct operations for examination of the same. But not alone would it benefit one in possession, in the event of seeking to dispose of a dwelling-house. What an advantage for a hesitating purchaser! Unquestionably he would much prefer accepting one with which he received a certified copy of the drainage scheme, and on which he might obtain the opinion of a competent sanitary engineer. Again, in the case of an epidemic invading a district, and necessity arising for a Government inquiry, what an immense assistance it would be if the commissioner or board of inquiry could have placed before them certified plans of the drainage of every house in the district under examination. It may be objected that if this proposition were carried out, great space would be required to lodge all the documents; that as there are about ten thousand houses and warehouses erected annually in London district alone, these plans accumulating annually would be cumbersome. This is an objection which can carry little weight in comparison to the probable good. A central establishment might receive the records every five years, and the local officials keep outlines of same on ordnance maps for daily reference. As to the outlay, it might be met by a slight fee for registration, and also for subsequent examinations, which fee might be increased according to the number of years elapsed since the first registration was received.

The CHAIRMAN said the paper seemed to him to suggest a most admirable arrangement if it could be properly carried out. The difficulty lay not so much in laying down the drains on a proper plan when the houses were first built, but in keeping up the alterations which took place in the drains after the houses had been in use for some years, unless there was some bye-law or Act which would require the owners not to alter their drains without communicating with the local surveyors (cheers), but he did not see how the arrangement could be enforced everywhere.

Mr. DENHAM W. HEMPSON'S paper on 'Sanitation and Sewage', Mr. C. HENDERSON'S paper on 'Results of Experiments in Warming and Ventilating Buildings', and Mr. H. C. STEPHENS' paper on 'Ventilation' were read.

The following is an abstract of Mr. Henderson's paper:—If heat be got up in a stove-room, and be discharged horizontally into a building by an opening of 3 or 4 square feet dimensions, and about 7 feet above the floor, the heat so accumulated instantly flies off in all directions, and with the singular result of establishing perfect equality in temperature throughout the lower region of the building. This warmth, when once established in a building, ought not to be lightly sent away, as it usually is, by openings in the roof. It ought to be kept there, and outlets made for its escape near the floors, seeing that a stream of warm air continues to be poured in from the stove-room. Then as to ventilation. When the congregation enters, they immediately begin to vitiate this air, and the vitiation renders it heavier than it was, and so unable to ascend and mix with the pure air above. Seeing, then, that pure hot air continues to enter above, it follows that the vitiated air is very soon driven up the outlets made near the floor, either by tubes in or on the walls (say pilasters), or by pipes from the roof; discharging into a cavity above the ceiling or to outside. The pipes, of 3 or 4 inches diameter, to within about 8 feet from the floor, if widened out there, so as to form a reflector, and the gas-pipe brought down inside, an excellent mode of both lighting and ventilating would result. Were a circular row of jets placed in the focus of the reflector, which ought to be wide, perhaps 2 or 3 feet diameter. The mode of raising heat is an open question, but it may be preferable to use a coil of hot water pipes (under pressure), enclosed in an upright case, or a gill-stone, with smoke pipe also with gills. To bring the matter more clearly before you, suppose this wall to be warmed; a stove-room outside this wall, or in the flat below, and in either case, an opening of 3 by 1 square feet, cut 6 feet or so from the floor. The heat to enter at 100, 200, or 300 degrees temperature; it flies off in all directions, giving the singular result of each of the thermometers being exactly alike, irrespective of distance. Then for ventilation, pilasters might be placed on these walls, so as to form tubes for the escape of the vitiated air.

Friday, Oct. 24th, 1879.

An address by G. J. SYMONS, President of the Section, on 'METEOROLOGY AND GEOLOGY', was read.

Mr. HAVILAND'S paper on 'GEOLOGY' was read, of which we subjoin the conclusion: 'Before we can boast of any sanitary science, let us be able to point to our researches on the climates, the soils, the diseases, we find at home and abroad in our vast colonies. Let the crust of the earth in various parts of the globe be thoroughly examined in its relation to diseases—recollecting that, had not man been born, there are certain spots in this earth that produce certain specific poisons, the chemical constitution of which we know nothing. Such spots should be mapped, after having been thoroughly investigated as to soil and climate, for the use of emigrants, colonists, and those in command of our soldiery. For want of studying the geology and climate of the stations to which we have consigned, and still continue to consign, these expensive but most necessary members of society, how many valuable lives have been sacrified, how much treasure squandered! How many times have we sent, and shall continue to send, our troops to encamp upon the dried-up beds of rivers which, as Sir Ranald Martin has said, are the deadliest of sites. How often are we to be taken aback by fever breaking out on such a rock as Gibraltar? When will the conductivity of our soils as regards heat be studied? I have said that man spoils the site which he has selected to live on. Let us only look at that map of distribution of fever in England and Wales, and know that wherever you see the districts coloured blue in different shades, there are to be found the polluted soils which man has converted into so many beds of disease. You have only to study the geology in connection with these blue groups, and you will soon see the cause.'

Mr. J. LUCAS'S paper on 'THE QUANTITATIVE ELEMENTS IN HYDROGEOLOGY', and Mr. H. SOWERBY WALLIS'S paper, 'RAIN COLLECTED FROM ROOFS CONSIDERED AS A SOURCE OF DOMESTIC WATER-SUPPLY', were read.

In the discussion which followed on the latter, Mr. PORTER said that he considered rain-water far preferable for household purposes to hard water.

Dr. CARPENTER said the cottages on the hills in

that neighbourhood were frequently without water for weeks together, and carts had to be sent down into the town to carry water up to them, and when they got it, it was of a very indifferent character, frequently being taken from ponds. Mr. Wallis's paper was a very practical one, and would, he hoped, be of service to many of the landlords who lived around there, and who would be able to draw some lessons from it, and give instructions to their land-agents to see that their cottages were provided with water. To suppose for a moment that a duty like that was to devolve upon the State was a very serious error. He thought it was the duty of owners to see that their tenants were supplied with water. Those who had had a bath in rain-water of a morning could compare the comfort of it with that of hard water.

Mr. G. CORDEN'S paper, 'THE INFLUENCE OF WEATHER ON DISEASE', was then read.

Dr. CARPENTER thought a great alteration was necessary in the way registration was carried out, as the present registration of deaths was of no scientific value. He did not think it was a fair thing to impose on the doctors the duty of giving information as to disease, for they were not called in for the benefit of the State. The State ought to see that it is done, and the doctors would be, he was sure, ready to help, but the duty should devolve upon the householder, who should be bound, whenever a case of an infectious character occurred, to give notice to the local authority; and it should of course be the bounden duty of the medical man attending the patient to inform him of the nature of the disease when he was aware of it.

The CHAIRMAN did not care in what way the registration of disease was effected, whether by the medical man or householder, but that it ought to be done systematically admitted of no doubt.

Saturday, Oct. 25th, 1879.

A Supplemental Section was held, when Dr. RICHARDSON occupied the chair.

Dr. BALBIRNIE explained some diagrams which he exhibited to illustrate what he termed scientific quarters for British soldiers. He suggested the improvement of ventilation by means of a large central chimney, which would exhaust the foul air, on the principle adopted at the French Legislative Chambers in France. By that principle no man would breathe the same air twice. For three generations they had been unable to ventilate the French Chambers successfully, but now that they had adopted the principle of a central shaft, there was perfect ventilation. It was virtually the principle adopted at the House of Commons and at Pentonville Prison. Of course it was necessary to keep up a perpetual fire in order to get rid of the foul air. The model barracks he designed would be capable of accommodating thousands of men, and would be a city of health in miniature, and more readily adapted to military requirements than existing arrangements.

Prof. de CHAUMONT objected to the palatial style of buildings which Dr. Balbirnie proposed as being contrary to the views now generally accepted. It was not desirable to concentrate on one spot such a large number of men. He also objected to the long rooms proposed, with the openings at the ends into corridors. That was the style of barracks at Aldershot, which were considered to be not advantageous. Then one general system of ventilation for the hospital was not desirable, as it did not admit of their isolating a ward at any time. At Netley Hospital, for example, which was ventilated something after the plan advocated by Dr. Balbirnie, they experienced the greatest possible difficulty in effecting isolation. As to Sir Joshua Jebb's principle, which was adopted in the Pentonville Model Prison, the exhaust tower, with the furnace in the centre, was supposed to extract the foul air, but he submitted that the effect of the exhaust tower only extended to the cells in the actual neighbourhood of the tower, and not to the more distant ones. In fact, all systems of ventilation on a large scale had proved failures.

Mr. J. E. ELLISON'S paper on 'VENTILATION OF BUILDINGS' was then read.

The CHAIRMAN said he thought the best ventilation was obtained by introducing the air very high in the room, and having an outlet above that. The air was thus warmed as it came in by the warm air which it met in the upper strata; there was a better current through, and a more uniform distribution of the air through the room. He would undertake to say that in 99 houses out of 100 in London, instead of proper provision being made, there was no chance for the air to get in except through the chinks of doors, windows, holes in the shutters, and so on, where the air came in just in that condition which gave cold.

Mr. ELLISON, in reply, said he could not agree with Dr. Richardson as to the desirability of admitting the air at the top part of the room, because unless they sent in a large quantity, they would find they could not keep the air sufficiently pure. A much smaller quantity admitted at a lower part of the room would be more effectual.

Dr. SOPER offered a few remarks on the 'DISINFECTION OF EXCRETA', and explained his apparatus for generating chlorine. He said that although he agreed with what Mr. Ellison had said, he went a great deal further, and said that they ought to produce a diffusing disinfectant, one that would float in the atmosphere and counteract the noxious exhalations of sick persons. He strongly recommended chlorine, which he thought was without a rival.

The CHAIRMAN was happy to bear testimony to the value of Dr. Soper's apparatus for diffusing chlorine, as it had the merit of simplicity, economy, and great utility. He had himself used it for twelve months, and it had given him great satisfaction.

Prof. de CHAUMONT did not think chlorine was so efficacious a disinfectant as was generally believed. It might answer the purpose of deodorisation, either of decomposing substances, or getting rid of smells, but they must draw a very clear distinction between disinfection and deodorisation. To imagine they could disinfect a fever ward by generating chlorine or any other gas was to nurture a delusion. Dr. Soper's apparatus might be extremely valuable, and perhaps there was nothing better than chlorine for deodorisation, but to confound deodorisation with disinfection was a fatal error.

The CHAIRMAN read a paper by Mr. F. H. Porter on the 'SOFTENING AND PURIFICATION OF WATER BY THE PROCESS OF THE LATE PROF. CLARK'. The way in which Dr. Clark makes use of lime for this purpose may best be described in his own words:—In water, chalk is almost or altogether insoluble, but it may be rendered soluble by either of two processes of a very opposite kind. When burned in a kiln, chalk loses weight. If dry and pure, only nine ounces will remain out of a pound of sixteen ounces. Those nine ounces will be soluble in water, but they will require

not less than forty gallons of water for entire solution. The burnt chalk is called quick-lime, the water holding the quick-lime in solution is called lime-water, and the solution thus made is perfectly clear and colourless. The seven ounces lost in burning the pound of chalk consists of carbonic acid gas. The other mode of rendering chalk soluble in water is nearly the reverse. To dissolve in the second mode, not only must the pound of chalk *not* lose seven ounces of carbonic acid, but it must combine with seven *additional* ounces of that acid. In such a state of combination chalk exists in the waters of London--dissolved, invisible, and colourless, like salt in water. A pound of chalk thus dissolved in 560 gallons of water would form a solution not sensibly different from the filtered water of the Thames in the average state of the river (and 1 lb. in 400 gallons of spring water). If the forty gallons of clear lime-water be mixed with the 560 gallons of clear water in which a pound of chalk has been dissolved by the addition to it of seven ounces of carbonic acid, a haziness very soon appears; this deepens into whiteness, caused by the nine ounces of quick-lime entering into combination with the seven ounces of carbonic acid, by means of which the pound of chalk was dissolved and rendered invisible in the 560 gallons of water—for by this combination of the nine ounces of quick-lime with those seven ounces of carbonic acid, a pound of insoluble, and so visible, chalk is formed; while the pound of chalk deprived of those seven additional ounces that rendered it soluble and invisible, becomes again visible, insoluble. Thus there are two pounds of chalk reproduced in a solid state by adding the forty gallons of lime-water to the 560 gallons of water containing the solution of bi-carbonate of lime. But these two pounds of chalk, however, are reproduced in infinitely minute crystals, and it is only after a considerable lapse of time that these subside to the bottom of the vessel, leaving the water beautifully clear above.

A vote of thanks was then given to the Chairman, and the Congress was brought to a close.

A visit was paid to Anerley Schools in the afternoon, and here Mr. EDWIN CHADWICK read a paper on 'Norma of Sanitation in the School Stages of Life, chiefly on the Half-time Principle of Mixed Physical and Mental Training as displayed at the North Surrey District Orphanage Institution at Anerley', of which we publish an epitome at page 176.

A closing meeting was held at Croydon on November 8, Dr. Richardson presiding, to hear addresses from physicians and other 'well-known scholars in sanitary science'. Dr. Richardson took the subject of 'HEALTH AT HOME' as the topic of his address. He remarked, in commencing, that the old saying, 'There is no place like home', had a singularly happy meaning when applied to health, and the benefits which emanated from health. Those engaged in forwarding sanitary work might labour all their lives and still do little good until each home was included in the plan of the work. The river of national health must rise from the homes of the nation, and then it would be a great river on which every blessing would be borne. He proceeded to remark that ladies had been specially invited, because the women were at home when the husbands were abroad. The woman who was at home must be the continuous and natural guardian or ward of the health that should centre in the home. When he, as a physician, entered a house where there was contagious disease, his first duty was to look at the surroundings. If they were wholesome in accordance to the dictates of common sense, then he was assured that the better half of success in the way of treatment and prevention was secured. If, on the contrary, the surroundings were unwholesome, slovenly, disorderly, and careless, then he knew that all that could be advised for the best would be more than half useless, because there was no habit on which any dependence could be truthfully placed, and because habit in the wrong direction was so difficult to move that not even the strongest ties of affection were a match for it in times of emergency. If the wives and mothers could be made to learn the habitual practice of all that tended to health, there would soon be an easy victory over disease; and those who were known as 'pioneers of sanitary work' would soon lose their title, the work duly becoming a recognised system and a recognised necessity. In the course of a practical discourse, Dr. Richardson then proceeded to insist upon the necessity of admitting sunlight to the home, saying, keep this word in your minds—'light, light, light—sunlight feeds with its influence, and leaves no poisonous vapours in train'; he gave advice on 'sleep at home', urging that a full quantity of sleep given to children was storing up invigorated existence for the future; he described the necessity of beds being neither too hard nor too soft, and urged the pressing need for cleanliness. The other parts of his address were devoted to dealing with the matters of 'tubbing' and 'the air at home'. In conclusion, he commended to the notice of his listeners as worthy of example, the system of the Jewish community in having the 'annual cleansing at home'. The president was greatly cheered on resuming his seat.

Captain GALTON read a paper on 'AIR', in which he set forth the dangers of bad air, and gave advice as to the tempering of air in admittance to the house. He asked his hearers 'to think', assuring them that sanitary science was made up of single principles within the reach of every one to understand, and if they would only attend to those principles they would find their health and that of their children improved, and their power of work and usefulness would be vastly increased.

Professor de Chaumont spoke on 'Health and Good Food', remarking that men and women, in the management of their bodies, did unwittingly great injury to themselves, in the long run, by sins against physical laws in the management of their own bodies. An engine would not work without stoking, but the human body would work without the proper amount of food for a time only, and this was by the consumption of the engine itself. He pointed out that in addition to the dangers of over-feeding and under-feeding, there was partial starvation by deprivation of one particular kind of food. With regard to scurvy, Dr. de Chaumont said he was sure a good deal of it exists in the mild form among a large number of people in this country, on account of the neglect of vegetable food. It is a good thing that potatoes have become so general an article of diet, as they are excellent remedies for scurvy; but half the good they do is lost by our way of cooking them. By peeling them before cooking, the most valuable part of the juice is lost; they ought to be boiled in their skins, or steamed, or if it is necessary to cut away portions when they are not very good, they should be stewed or made into a soup, so that the liquor they are cooked in is consumed as well. But should potatoes fail, every effort should be made to procure green vegetables, such as cabbage and the like, and onions, as the best substitutes. In conclu-

sion, he said that another form of starvation was the want of nitrogenous or flesh-forming food, and another form was the want of fat.

A paper by Mr. Chadwick, C.B., on 'Health in the Young', was read, and papers by Dr. Lory Marsh, Dr. Strong, Dr. Carpenter, and Mr. Symons. They were listened to with great attention, and thanks to the president and speakers were heartily voted.

THE EXHIBITION OF SANITARY APPLIANCES AT CROYDON.

In the October issue short descriptions of some of the articles to be exhibited were given. In number and variety of objects the exhibition at Croydon is a great improvement upon its predecessors at Leamington in 1877, and Stafford in 1878. Almost every kind of sanitary appliance is fairly represented. It is not our intention to give a complete description of all the objects exhibited, but to give such information as may enable those of our readers who are interested in particular appliances, the means of obtaining such particulars direct from the manufacturers. At this season of the year the means of heating and lighting claim attention. We will therefore commence with these apparatus: —

The Thermhydric Stove, Mr. H. Saxon Snell's Patent, manufactured by Messrs. Potter and Sons, 298, Oxford Street, W.—This apparatus consists of an open fire-grate surrounded on three sides and on the top by a wrought-iron chamber containing water. Upright coils of pipes some three inches in diameter are placed on either side. The hearth is made of iron; the whole space below the grate and pipes is formed into a chamber for the admission and collection of fresh air direct from the outside, by an inlet in the wall. The air passing in through this channel strikes against the sides of the hot-water chamber and pipes, becoming thoroughly heated, but not burnt, before entering the room. There is no unpleasant sulphurous smell arising from the apparatus—a result obtained by surrounding the fire on all sides, except the front, by water. The iron casing and the pipes cannot at any time rise to a higher temperature than that of boiling water. These pipes and the casing of the Thermhydric Stove shown at Croydon were not hotter than could be comfortably borne by the hand. The grate is made with or without ornamental casing. It is surmounted by a handsome vase containing water, and by which the whole apparatus is filled when necessary. By the evaporation of this water an agreeable moisture is communicated to the air of the apartment. In heating power and economy of fuel the apparatus leaves little to be desired. It is particularly intended for the heating of large public rooms, infirmaries, and churches, but may be adapted for entrance halls, dining and drawing rooms, etc. The flues can be made either ascending or descending, as may be required to suit special circumstances.

The Patent Hygienic Ventilating Stove, manufactured at the Eagle Foundry, 304, Broad Street, Birmingham.—This stove has no water chamber or pipes. There is a dome of iron above an open fire: this dome is divided into an upper and lower chamber; the latter is divided vertically by a partition of iron reaching from the bottom to within about a quarter of the whole height of the dome. The upper division of the dome has outlets directing the current of heated air upward. A spacious chamber is provided at the back of the stove; this is, by a passage in connection with an airway opening into the external air, in communication with the upper division of the dome. To make the action of the stove clear, we will take the course of a current of cold air from its first entry through the aperture in the wall. It passes up into the chamber behind the fire; here it is warmed. Ascending still higher it finds its way into the upper dome, where it becomes still more heated. From here it passes by the openings in an upward direction toward the ceiling. Vitiated air is constantly drawn in over the fire through the first division in the lower dome, over the partition and up the chimney with the products of combustion. It will be seen that a constant circulation of air is kept up; perfectly pure heated air being drawn into and diffused through the apartment, vitiated air continually passing out. By the opening direct to the outer air draughts from doors and windows are prevented, and the apartment kept at a pleasant and equal temperature in every part. The supply of air admitted is so arranged as to balance that removed. Valves are provided for regulating the fire and the quantity of air. It is stated that this stove effects a saving in fuel of 60 per cent. compared with ordinary stoves.

Constantine's Improved Enamelled Hot-air Radiating and Economising Slow Combustion 'Treasure' Stoves, manufactured by Mr. T. J. Constantine, 61, Fleet Street, E.C.—These are very handsome in appearance, the enamel being of a peculiarly lustrous and intense black. They are made in a variety of ornamental designs. The larger sizes are provided with hot-air chambers on both sides of the fire, and openings from the external air. When warmed, the air passes out into the room through ornamental perforations in the front and sides of the stove. Great economy of fuel is claimed for these 'treasure' stoves. They require no brick setting and can be placed anywhere. Several sizes are made to suit various requirements, but the smaller kinds have no hot-air chambers.

The Abbotsford Stove is shown in various sizes by Messrs. Clark, Hunt, & Co., 159, Shoreditch.—These are ordinary coal burning stoves, but having a fire-clay bottom, sides, and back. The fire comes nearly to the level of the floor, and rests upon the solid fire-clay hearth. Economy of fuel and perfect combustion are claimed for this arrangement. A large variety from a few shillings in price are made.

Mr. Thomas Waller, 47, Fish Street Hill, E.C., has a Patent Fire Contracting Stove.—Movable cheeks of fire-clay, pivoted at the back of the grate and fitting into a recess on each side, are used in this invention. The fire can be reduced by drawing out the cheeks; this obviates the use of false backs, bottoms, and fire baskets.

Whitwell's Patent 'Save-all-Waste' Register Stove Grate, is shown by Messrs. Hammond and Hussey, of Croydon; the grate is manufactured by the Coalbrookdale Company, near Wellington, Salop.—In this grate air is admitted through an opening in the outer wall. It is warmed in its passage through various pipes and chambers, and finally passes into the room by openings in front of the grate. Large quantities of air are quickly warmed and ejected into the room. Means are provided for carrying off vitiated air. This grate is economical in action, and has been adopted by several school boards for use in the schools under their charge.

Heating of Apartments by Gas is a speciality of Messrs. Billing & Co., 90, Hatton Garden, E.C., who show a large selection of their 'Sun Dial' gas stoves.—They are made in every possible variety of design. Some are for placing in an ordinary grate, which then, without alteration, becomes a heating stove, using gas instead of coal. Others, again, are intended for places where there is no chimney, or to take the place of coal-burning grates. The distinctive feature of this firm's manufacture consists in the use of a corrugated reflecting surface of polished copper; this gives a warm and pleasant appearance to the stove—the burners are out of sight.

Asbestos Gas Fires are shown by Messrs. H. C. Davis & Co., 286, Camberwell Road.—The cheerful appearance of an ordinary open stove is obtained by the use of this substance. Black asbestos is used for the front, so as to give the appearance of an ordinary coal fire-place when the stove is not in use. On lighting, the substance becomes red hot and gives out intense heat. One or two local exhibitors have gas stoves on this principle.

Gillingham's Radiating Heat Generators, invented by M. J. Gillingham, Chard, may be briefly described as a horizontal pipe or tube of any convenient length, curved at the ends and supported by tubular

pedestals. From the horizontal, an open pipe passes in a vertical direction. Under this is placed an ordinary lamp burning paraffin oil. The heat passes up the cylinder and along the horizontal tube, in either direction, giving off a large amount of heat by radiation from the whole length of the heated surface of the tube.

APPARATUS FOR THE PRODUCTION OF GAS FROM GASOLINE are shown by Messrs. J. Edmundson & Co., 19, Great George Street, Westminster, S.W. (Wigham's PATENT ATMOSPHERIC GAS APPARATUS), by the Portable Gas Apparatus Company, 16, Great Queen Street, Long Acre, W.C. (The PORTABLE GAS MACHINE and by the Sun Lighting and Heating Company, 115, Southwark Street., E.C. (The SUN AUTO-PNEUMATIC GAS MAKING MACHINE).—The latter company also exhibit Hearson's Patent Automatic Gas Lamp, recently described in these pages. This lamp makes the gas as it burns it by means of an automatic arrangement, by which gasoline, passing from a small reservoir, is vaporised by the heating of the tube leading to the burner. It is a cheap and useful lamp for small country towns, giving little trouble to keep it in order.

The HESPERUS STAR LAMP is shown by Messrs. Jones and Willis, 260, Euston Road.—Three wicks placed in the form of a triangle are used. Consumption of oil is stated to be six ounces per hour. Any kind of mineral oil may be used. A soft and brilliant light, at a reasonable cost, is produced by the Hesperus lamp. It is provided with a patent arrangement extinguishing the light, obviating the danger of turning the wicks down into the oil.

COOKING STOVES AND RANGES FOR GAS are shown by Messrs. Billing and Co., 90, Hatton Garden, E.C. This firm has a large number of its 'SUN DIAL' GAS STOVES, of which some are arranged for both cooking and heating; they have varieties, ranging in size from 15 inches high, 12 wide, and 9 deep, for warming a small room, boiling a kettle, and cooking a chop—up to those capable of roasting a joint, a couple of fowls; grilling chops, steaks, and bacon; baking pastry, and rice-puddings; stewing, boiling vegetables, etc., all at the same time. In these stoves, which are capable of doing a very large amount of work for a small outlay, the products of combustion do not come in contact with the food. Atmospheric burners, supplying a certain proportion of air, which mixes with the gas, and burns with it, are used in all these apparatus. There is a complete absence of smoke, smell, and dust, together with great economy, as compared with the old-fashioned open kitchen-range.

Messrs. John Wright and Co., Essex Works, Broad Street, Birmingham, have a variety of their New Gas Cookers. As in the case of the exhibits of Messrs. Billing and Co., there is much to commend. To give a description of the different apparatus exhibited would occupy considerable space; the lists issued by each firm containing some thirty or forty makes of appliance, to suit particular requirements. Other manufacturers of gas cooking apparatus are Messrs. Scott, Brown, and Co., George Street, West Bromwich; Messrs. Wilson and Blessley, 1, Paul Street, Finsbury, E.C.; and Messrs. Siddaway and Sons, of West Bromwich.

A neat, compact, and useful cooking apparatus, for small families, is the 'REFORMER STOVE', patented by Mrs. Amelia Lewis, and sold at 37, Blackfriars Street, Manchester. It is about the height of an ordinary table. The top is flat, and has room for a couple of large fish-kettles, and two or three saucepans; there is room in front for roasting a good large joint; while the boiling and stewing operations are in progress. A combination steamer is supplied. This consists of three roomy receptacles for the steaming of food, placed one above the other. Meat may be stewed in the lowest division, puddings steamed in the next, and potatoes in the top one; a baking cover is also provided. The stove is intended to stand in a room, either with a pipe leading to the outer air, or to be placed on the hearth from which an ordinary stove or range has been removed. The apparatus is strictly economical in use, and has sufficient room for the preparation of all food required by a family of eight or ten persons.

Another compact little contrivance, for cooking by gas or oil, is the 'METALLIC HOUSEKEEPER', sold at 325, Strand. In external appearance it resembles a cylinder of polished tin, standing on three iron feet. It has a domed top, and a handle for carrying the apparatus from place to place. The cylinder is some three feet high, and one in diameter. On taking it to pieces we have three different portions—the lower holds water, the others are fixed tightly together, to prevent escape of steam. Ledges, for resting cooking trays on, are provided. The cooking in this apparatus is done by steam rising from the water in bottom division. Meat, puddings, and two or three kinds of vegetables may be prepared at the same time; water, for tea or coffee, and washing plates and dishes, being also heated. By using either gas or oil, the temperature may be regulated to desire. No unpleasant smell arises from the bright tin surface, as the whole contrivance cannot rise above the temperature of boiling water.

The TREASURE COOKING RANGES, manufactured by Mr. T. J. Constantine, 61, Fleet Street, E.C., are made in several sizes. The distinctive feature of these ranges is the entire closing in of the fire, except a small door, for the regulation of air, admitted to, and passing through the fire. No. 20, family range, cooking for a family of twenty persons, was specially tested for three months, by F. W. Hart, Esq., F.C.S., at a time when coals were 40s. per ton, and the cost of fuel only found to be one penny three farthings per day. This may be accounted for by the complete manner in which the supply of air is regulated. The inventor asserts, that owing to the perfect combustion of gas which is effected in his ranges, no unpleasant odour arises from them.

BATH HEATERS are shown by Mr. W. Hellier, 16, Duke Street, Grosvenor Square, W. They are arranged for supplying either cold or hot water. In the latter case, gas is lighted under the heater. On turning a tap, water, heated to one hundred degrees, is continuously and immediately supplied. A small cistern is provided, with a regulating automatic tap. Messrs. Siddaway, of George Street, West Bromwich, and Messrs. Ewart and Son, Euston Road, show similar apparatus. There is a slight difference of detail in each, but the effect produced is the same—a constant supply of hot-water at any time, when required. No expense for hot-water circulating apparatus, or special cisterns, being entailed.

VENTILATING APPARATUS are shown by Messrs. Boyle and Son, Glasgow; Mr. Ellison, Leeds, Conical Inlets and Outlets; Mr. Stevens, Lee Green, Drawer Inlet Ventilator, and Exhaust Ventilating Shafts. All these have been fully described in the 'Dictionary of Sanitary Appliances', by W. Eassie, Esq., C.E., which has for some months appeared in our pages.

Messrs. C. H. Sharp and Co., Southwark Street, have a Ventilating Wall Filter; this very closely resembles Stevens' Drawer Ventilator, except that the lower portion turns on a pivot, instead of the whole apparatus coming out bodily from the wall. The same house exhibits the Crown Ejector; it does not, however, differ in any essential particular from Mr. Stevens' Shaft, that of the Vacuum Ventilator Company, and other forms already described by Mr. Eassie.

Messrs. Herding, 2, East Parade, Leeds, have PATENT AIR DIFFUSERS, briefly described last month.

Mr. James Hamilton, 67, Yorkshire Street, Rochdale, shows Deflectors and Ventilating Crosses, acting on the well-known exhaust principle. Mr. John Gaunt, 57, Bartholomew Road, Kentish Town; Symonds' Patent Electric Automatic Ventilator. Inlets or outlets for air are, in this invention, placed under the control of a battery, acting when the temperature rises or falls above or below a certain range. This is effected by an ordinary maximum and minimum thermometer, having platinum wires inserted at such distances from the mercury as to make contact through it, and complete the circuit when the desired temperature is reached. Electro magnets, actuated by the current, perform the mechanical closing of the inlets and outlets. Mr. R. Adams, 7, Great Dover Street, S.E., shows his Patent Fanlight Openers. A screw, worked by

a handle, placed at a convenient height, opens, closes, or partially opens the fanlight.

Messrs. J. Moore and Sons, Sekforde Works, St. James's Walk, Clerkenwell, E.C. Patent Improved Glass Louvre Ventilators, and Circular Glass Ventilators.

Mr. U. Knell, 37, Wood Street, E.C. The 'IMPERIAL' WINDOW. Ordinary windows can be cheaply altered to his system, which consists in placing a pivot at the centre of both upper and lower sash. End of cord, used in ordinary sliding sashes, is fixed to a piece of wood, to which the pivot is screwed. By opening either sash at varying angles, a current of air, deflected to the ceiling, is admitted.

Dr. Willington's SPECIAL, or RESPIRATOR PRINCIPLE COWL, has a coned top, surrounded by a close mesh of finely woven copper wire; a cap of the same substance is provided, for regulating upcast current. Manufactured by Mr. W. Northcroft, 51, Mina Road, Old Kent Road, S.E. Ewart and Son, Euston Road, N.W., have the Empress Ventilator, described last month. It combines the cone exhaust and revolving Archimedean screw principle in one appliance.

Further notices of other Exhibits will appear in the SANITARY RECORD of December 15.

At the closing meeting of the Congress, held on November 8, Major McCoy, Secretary to the Sanitary Institute, announced the Awards. The judges of the best exhibits in competition for the medals and certificates of the institute were Dr. H. C. Bartlett, Mr. W. Eassie, C.E., Dr. Corfield, and Mr. Rogers Field. They award medals to Aveling and Porter, Rochester; Messrs. Doulton, of Lambeth; Messrs. Frazer, of Commercial Road, for disinfecting apparatus; Hamilton and Co., Leadenhall house, for prismoidal pavements and other lights; Lascelles, of Bunhill Row, for concrete houses and baths; Sinclair, of Leadenhall Street, and Wilcox and Company, of Leeds, the latter for one of the most complete exhibits seen by the judges in fire-clay. G. Jennings, of Lambeth, Pritchett, of Bishops Stortford, Headley and Son, of Cambridge, the Hygienic Stove Company, Birmingham, and Ellison of Leeds, were among the certificated exhibitors.

NOTICE.

WE regret that, owing to the pressure on our space, the publication of Part XXVIII of the 'Dictionary of Sanitary Appliances', by W. Eassie, Esq., C.E., is unavoidably postponed until December 15.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

VENTILATION OF ROOMS.

The idea of ventilating a room by a method similar to that of Councillor Smith's—as mentioned by Mr. Eassie in the SANITARY RECORD, October 20—occurred to me some three years ago. About two years since it was adopted, at my suggestion, in a room of a house occupied by a medical friend in Suffolk. In this case advantage was taken of a hollow space at one side of the chimney breast, which formed a shaft reaching from the ceiling to the floor. An opening about six inches by four was made into this shaft near the ceiling, and a drain-pipe (six inch) was inserted at floor-level, so as to form a communication between the shaft and the space directly under the bottom bars of the fire-grate; the front of this space being covered in by a movable sheet of metal. All air passing through the bottom bars of the grate was thus drawn from the top of the room. An improvement would be to attach the horizontal tube to the central hollow cone of one of Wavish's fuel economisers. Where a 'Parson's grate' is used, a fire-brick tube might be placed in the bottom or at the sides of the grate to communicate with the horizontal shaft. A room thus ventilated would require less fresh air, the fire being partially fed by foul air. In the case of a fever ward, the germs of contagion would be destroyed by passing through the fire.

W. W. STAINTHORPE, M.D., S. Sc. C., Edinbro'.
Medical Officer of Health.

Wareham, Nov. 2nd, 1879.

THE ISOLATION OF INFECTIOUS DISEASE.

I ask you to give an editorial opinion, if possible, in your next issue, on the following points. The urban sanitary authority of A— purchase a building with ground attached, for the purposes of an hospital for 'infectious diseases', the great object being isolation and prevention of 'spread of infection'. The building was originally a two-story villa residence, all rooms directly or indirectly communicating with each other under one roof. A threatened epidemic of 'small-pox' occurs. Application is made to admit cases of 'small-pox' into this hospital. Medical officer advises against such admission on following grounds:—1. That small-pox is an exceptional disease, and is now throughout the United Kingdom treated as such, in an exceptional manner—viz., by separate accommodation. 2. That the admission of such cases would involve a mixture of small-pox, scarlet fever, typhoid, or typhus, etc., under the same roof, without practical isolation from small-pox; that such a course would tend to spread of infection, not to prevention of such disease. In point of fact, the medical officer declared against such hospital being utilised for cases of 'small-pox', and advocated the immediate erection of a temporary or auxiliary hospital for small-pox. I put the following questions to you in your editorial capacity, and think it will be very much to the benefit of the public in general, and of the medical officers of health in particular, if you will give the matter your consideration, and after that consideration give an expression of opinion in your journal. I put the questions as follows:—Query 1. Is there any danger of propagation of small-pox to cases of scarlet fever and typhoid, etc., supposing the cases to be in the same building and under the same roof, without possibility of complete separation? We will even suppose vaccination to have been performed in all—or even some. Query 2. Is it probable or possible that the admixture of such cases under such circumstances where contact and communication between the houses could not be prevented, would conduce to the spread of infection? Query 3. Is it consonant with the opinion of the best authorities to advise or carry out admission of small-pox into any hospital intended for, or liable for, the use of patients suffering from other fevers.

M. O. H.

[1. The danger to patients suffering from fever or scarlet fever by the admission of small-pox cases into the same building, will depend materially on the construction of the building and the facilities for complete isolation of the small-pox from the other cases. If the building have two staircases, and the whole of the upper floor were devoted to the small-pox patients; if the chimneys of the rooms used by the fever cases did not adjoin those occupied by the small-pox patients; if the laundry arrangements were such as to admit of the washing being done separately; if there were no admixture or intercourse between the nurses, the building might perhaps be safely used, provided also that all the discharges from the small-pox patients were properly disinfected. 2. There cannot be any doubt that the introduction of small-pox patients into a building where there is no possibility of complete separation, and where contact and communication between the nurses attending persons suffering from different infectious diseases cannot be prevented, must be very likely to communicate that disease amongst visitors and the other patients. The precautions necessary to prevent the spreading of small-pox being much more

stringent than those required for typhoid cases, would unnecessarily limit the admission of friends to visit the latter patients, and would therefore be unfair to them as well as perhaps injurious to the visitors. 3. All the best authorities on the subject oppose the treatment of small-pox cases in a general hospital or amongst other patients, and they should not, under any circumstances, be admitted except under the conditions mentioned in the reply to query 1.—ED.]

VENTILATION AND SANITATION.

With the return of winter, when we are all obliged to have large fires and to sit with the doors and windows of our rooms closed, the real importance of a proper system of sanitation and house drainage is forcibly brought to our minds, though often not sufficiently so until serious illness or a death has been caused by sewer or other dangerous gases being drawn into the house through defective arrangements in connection with otherwise good closets, sound soil-pipes, and house drain-traps. You were among the very first to express a high opinion, theoretically, of the Banner system of sanitation when it was first made known to the public in 1874, since when there have been many imitations of it. Allow me now to state how it has borne the test of time, and answered practically. In my own house, of which an account was first given in your RECORD of June 5, 1875, my patent lever trap, of 1872, was used in combination with 'inlet' and 'cowl', and all have ever since, without the least interference, acted perfectly and still continue to do so. The system was applied on a large scale, as far as I know, first at Guy's Hospital, over three years ago, and immediately afterwards at the well-known residence of the Marquis of Exeter, Burghley. At the former fourteen and at the latter thirty-six Banner Cowls were fixed; in neither case have they been interfered with in any way whatsoever, not even to oil them, and at both these most important places the system still continues to give entire satisfaction and works noiselessly and perfectly. As you said, 'nothing better need be desired'. Now, some even seem to think that it is unnecessarily perfect. It has since been applied with results equally satisfactorily alike to myself and all parties concerned, amongst a great number of other important places, at the Duke of Abercorn's town mansion in Dean Street, and at Baron's Court; the Duke of Sutherland's and the Marquis of Headfort's, and also at Kylemore Castle, the seat in Ireland of Mitchel Henry, Esq., M.P., and at his noble town residence, Stratheden House. I enclose to you a great number of most gratifying testimonials which have been sent to me, any of which you are at liberty to publish in your valuable journal in case you think fit to do so. Let me direct your particular attention to those of the Duke of Abercorn and Mr. Mitchel Henry; both you will notice are expressed in terms of unqualified approbation, and Mr. Henry adds to the value and public importance of his by stating, as is well known in fact to sanitarians, that for many years, in connection with his former profession, he had paid attention to sanitary questions and especially to drainage. He further writes: 'I wish to say how much I am delighted with your system; I venture to say there is not, and cannot be accumulation of gas because hardly any gas can be formed, and whatever is formed passes rapidly up and through your ingenious, simple, yet powerful Cowls. I have now a feeling of comfort and security as regards the healthiness of the house which I never had before.' This is in direct contradiction to what was stated not long ago by Dr. Ainley, Medical Officer of Health for Halifax, that the Banner Cowl, like Professor Huxley's baby Bathybius, was a failure. Dr. Ainley seems to think that Stott's Furnace System of Ventilation, sufficiently applied 'at the other or distant end' of a sewer, will ventilate perfectly all house-drains, soil-pipes, etc. I confess I don't know how, neither, by the-bye, does he tell us. It is well known, however, that 'doctors differ', and so do engineers. There is another proverb not so well known, and which Dr. Ainley may think applies more to myself than anyone else, 'A small coin in a large empty vessel makes a great noise'. I said, in the paper read at the last Sanitary Congress of the Society of Arts, that 'as yet we seem to have no means of really ventilating a large sewer effectually. I am certain it is quite easy to perfectly ventilate a large drain'. At Croydon, the other day, Professor de Chaumont's 'of Netley Hospital' remarks went to this effect: that the evil effects of sewer gas or sewer air were well known; that it gave rise to or aggravated numerous diseases; that it was dangerous in many, if not in all, diseases; and Mr. W. Eassie, the talented author of *Sanitary Arrangements of Dwellings, etc.*, in a letter to the *Building News* of 31st ultimo, says: 'In my opinion, the sewers of London possess almost a healthy atmosphere compared with the house-drains, and I am sure that I shall be sustained in my opinion by every sanitary engineer. The first thing that salutes one on entering up a house-drain, which is hampered by traps and without ventilation, as a rule, is a most horrible smell, the like of which is never encountered in a sewer, and this is the chief factor in engendering disease, loaded as the air is with various impurities and germs of mischief.' I am known to be in substantial accord with Mr. Eassie in the opinion he now expresses, but I cannot agree with him that the like is never encountered in a sewer. Mr. Baldwin Latham in the last edition of his excellent work, *Sanitary Engineering*, alluding to my Lever Trap of 1872, says: 'This trap looks a formidable piece of machinery for effecting so simple an operation as that of trapping a soil-pipe, etc.' He cannot have seen it, for really it is less than many of the traps in use for that purpose, and I challenge him to produce any other trap which will effect what my Lever Trap does, viz., forms a rigid barrier against gas from the drain ever entering the house. I shall be glad to show him my lever trap, etc., now in use at my house as it was originally fixed in 1874.

At the Sanitary Congress held at Croydon last week, Professor Corfield urged those 'who were earnest in sanitary matters to be united, and not go about wringing their hands because others were taking part in the good work of sanitary reform (*Times*, Oct. 24th). If he meant by this that 'honesty after all is the best policy', I quite agree with him, for sanitary science is in itself a noble study, conducive to the physical and moral improvement of mankind; and surely the pursuit of knowledge and truth should be with all its teachers, practical and theoretical, the primary object, unhindered by petty jealousies and prejudices, now sacrificed, as it too often is, at the shrine of self interest; rather, in the words of the late Canon Kingsley—that earnest and sincere advocate of all that is true and noble—'Let our hearts be bowed as the heart of one man, to say, that so far as we have power, so help us God, no man, woman, or child in Britain, be he prince or be he beggar, shall die henceforth of preventible disease.'—Yours obediently,

EDW. V. BANNER, C.E.

[We have just heard that the Royal Institute of British Architects has done Mr. Banner the honour of adopting at their own Hall, for the purpose of improving ventilation, the plan he inaugurated last year at the Council Chamber, Guildhall.—ED.]

The Earl of Bradford has offered to present to the Walsall Town Council, on certain terms which have been agreed to, forty-six acres of land near Walsall, to convert the same into a public recreation ground.

The Massachusetts Board of Health recommends, in their tenth Annual Report, that the manufacture or sale of articles such as wall-papers, coloured papers, etc., improperly containing arsenic, should be prohibited by law. Perhaps when our Government has leisure to turn their attention to domestic legislation, we may look for some similar enactments, which are conspicuous by their absence in this country, the most advanced in sanitary progress throughout the globe.

ORIGINAL PAPERS.

THE FIRST PRINCIPLES OF SANITARY WORK.*

By Alfred Carpenter, M.D. Lond., C.S.S. Camb.

The science of disease-prevention is destined to alter the whole field of medical practice; to render obsolete much of our present knowledge as to the natural history of disease, and the measures which are now required for its treatment. The inquiry must come as to how the incidence of disease is to be prevented, rather than, having arisen, how it is to be cured. This will apply to every kind of complaint, and will not be limited to the zymotic class. Recent observations have shown that there is not much difference, except in degree, between tuberculosis and pyæmia; and that all the class of so-called strumous or scrofulous maladies, including consumption, are as capable of prevention as is ordinary blood-poisoning. The inquiry must be made, therefore, why phthisis appears so often in our death-lists, as well as scarlatina or typhoid fever. Nearly all the diseases which are fatal to young people are amenable to prophylactic measures, and capable of diminution in their fatal effects. If these deaths can be diminished—and of this there can be no reasonable doubt—it is probable that they may be altogether prevented by a right application of knowledge; and then pneumonia, bronchitis, mesenteric disease, and other causes of death among young people, will cease to be common among us, as well as those deaths which are produced by enthetic disease. Many of those evils which affect bony tissue, and which now give occupation to the surgeon, will then become diseases of the past. Those ailments which disfigure the human form will then be found more often in fiction than in fact among civilised people. It is a glorious field, and opens out to our view magnificent prospects. The death of the child will be the exception, and not the common end of more than half the human beings which are brought into the world.

I have come to the conclusion that there is no truth in the theory which I once heard propounded by an eminent sanitary authority: 'That sanitary science was responsible for the propagation of a weakened race of beings, and was therefore tending to people the earth with a debilitated race of men.' This is not the effect of sanitary science, but a consequence of a neglect of it. There is no occasion whatever for tissue or matter which is not required for the perfection of the human economy to be propagated for generation after generation, 'growing with its growth, and strengthening with its strength,' if the laws of nature be obeyed. The sequences of a disobedience to these laws are seen for three or four generations; but if the errors of the fathers be not followed by the children, there is sufficient power in the human frame to throw off the burthen, and to reclaim its birthright of good health. The gouty great-grandfather has the dyspeptic and rheumatic grandfather, the hysterical and neuralgic father, whose children throw out the mischief by some skin eruption or other evacuation; and the evil which the great-grandfather induced by his indulgence in the pleasures of the table, the bottle of port, and general laziness, is lost sight of. Let his progeny do right, and obey God's laws, and, at the end of three or four generations, there will be a removal of the gouty diathesis or the tubercular constitution. An observation of several generations in numerous families is convincing me that this is a right deduction. It must be so, otherwise there could not be a single healthy person among our English people. If we follow backwards the connections of each one of us, in five generations there have been sixty-two stocks, and, in six generations, a hundred and twenty-four individuals, from each of which every person has had the chance of inheriting disease, if inheritance were a progressive law. The chance of escape would be infinitesimal, and no healthy person could be found among us at all. True, it is a common thing for diseased children to be born of diseased parents, and for these children to die of that inherited disease in their infancy. It is uncommon, even if it ever occur except from accident, for the offspring of healthy people to be diseased at their birth; whilst delicate fathers and mothers very often produce sturdy children, who grow up without a particle of disease about them.

We may banish the idea that sanitary work promotes the growth of a diseased race, and tends to weaken the whole human family. The natural tendency of disease is either for it to destroy the blighted being, or for the diseased material to be expelled from the body. If a few generations could be brought to obey the laws which common sense and sanitary science have already pointed out as necessary to be observed, hereditary disease might become a thing of the past, as much as some of those maladies which used to be common among us, but are now altogether lost sight of.

The registration of deaths in its present form is of no scientific value; and, except the inference which may be drawn from the total number of deaths as compared with those which are produced by zymotic causes, is useless for scientific purposes. It will be observed that deaths registered as caused by pneumonia may have had an origin in some constitutional condition of the system, which, if it were tabulated, might give valuable information. The table as at present constituted places deaths, which have had a similar origin, in every part of the list. I would suggest, as a necessary alteration of the law regarding registration of deaths, that the certificate which details the cause should be transmitted direct to the registrar; that it should be a confidential document, the nature of which the registrar should be prohibited from disclosing; and that it should be the property of the State alone. I make this suggestion because a large portion of the deaths which now arise are due to causes which are not, and cannot be, registered. I especially refer to those which have had a syphilitic origin, or which have been caused by continuous indulgence in intoxicating drinks. A very large portion of the diseases which affect particular organs, and in which the first starting-point is a kind of fatty degeneration of tissue, have their origin in the habitual use of intoxicating liquors. Head, heart, liver, kidney, lung, are all subject to this change, and the consequences are diffused over the whole list. The Registrar-General's returns, as at present constituted, give little real insight into the habits of the people.

The basis upon which preventive medicine stands as a science is that of the particulate nature of contagia. It is the first canon law. We know that zymotic disease, which I represent by the formula x, y, z, will not arise if the particle z, or matter from without, is kept out of the process. Again, z cannot increase and multiply unless the material

N

* An abstract of the Address in Sanitary Science and Preventive Medicine, delivered to the Sanitary Institute of Great Britain, at Croydon, October 22nd, 1879.

which has been used up in supporting the functions of the higher forms of life be also present. There are, therefore, two manifest duties for the sanitary authority to perform; first, to remove the pabulum *y*, or used-up material, upon which *z* is able to increase and multiply, from its neighbourhood to man; and also, so to alter its character that it is no longer able to nourish *z* if the particle should be imported; second, to prevent the importation of *z*, or, if it be in our midst, so to alter its nature that it cannot fructify. These duties can be performed if the laws which regulate the introduction and the growth of *z* are well understood, and counteracting agents regularly employed. There are two forms of germ, the evanescent and the persistent. Measures which may be successful against the former, and may limit the spread of a present epidemic, will not necessarily prevent its recurrence in the future at the same place unless both kinds of germ are considered. There are several ways by means of which the natural order schizosporeæ may make itself felt, yiz., by the air, the water, the earth, or the food. The contamination of the air in the neighbourhood of our dwelling-houses, both above and below the level of the ground, must be counteracted. This contamination is effected in two ways: 1. By the ordinary processes of decay which are always going on in organic nature; and 2. By the aggregation of living creatures. Both give rise to excess of carbonic dioxide; without the latter, it is probable that fungi could not flourish, but it is animated nature which introduces myriads of the germs of debased protoplasm which is food for *z* to flourish in. The higher the animal life is in the scale of creation, the more injurious is the excreta of such animals, and that of man most of all. The remedy for these evils is ventilation; anything which impedes it is contrary to sanitary law. Motion is the second most important fact, and is the second law of sanitary work. Currents of air must be established to lessen the quantity of carbonic dioxide to something less than four hundred and fifty parts in a million; and, by introducing a fresh supply of oxygen, the albuminoid matters which living creatures give out may be altered in their chemical characters, and by that means they will no longer give renewed life to *z*.

I am convinced of the truth of the following conclusions:—1. Sewers are necessities for crowded populations. 2. Having sewers, they are silent highways along which human excreta may be safely and efficiently removed by water-carriage. 3. Sewer-gases and smells from decomposing sewage are not necessities of the system. 4. If sewage be judiciously applied to land, the spread of enthetic disease by its means becomes an impossibility. 5. After a proper application by surface-irrigation, the effluent water may be safely discharged into the nearest water-course. 6. The application of sewage to land must be conducted on scientific principles; otherwise failure, first financially, and then by producing nuisance, will arise. 7. A local board is the worst possible body to have the management of a sewage-farm. The management requires an intimate acquaintanee with several sciences, with agriculture, with sale and barter, and an immediate personal command of capital; without these powers it cannot become a financial success.

The eighth conclusion at which I have arrived, is that a local authority, in providing for the utilisation of sewage by irrigation, must be prepared to pay the difference in value between the price of the land and its ordinary agricultural worth. One penny in the pound on each rate, or at the most threepence for the year, ought to be amply sufficient for this purpose, as well as for the payment of interest on money sunk in unexhausted improvements. The Beddington farm, which has now been in operation more or less for twenty years, costs more than this; but if the farm had to be formed now, the experience which has been gained would enable the Board to carry out the work at a much less cost.

The ninth conclusion to which I have come is, that although sewage should be conveyed to the soil as rapidly as possible, rainfall should go to river. It is a wrong thing to conduct rainfall into sewers, as by this means a sewage-farm is swamped with unnecessary water. Not that storm-water from the streets of London should be sent into the Thames, or the washings of thickly-peopled cities at once into the water-way, but ordinary surface-water should be strictly excluded, and, when possible, the rain-water from house-roofs should go to the water-courses. This is a good reason for excluding sewers from thinly-peopled districts; ordinary sewers will only drain the subsoil, empty the water-courses, and dry up the smaller sources of our rivers, and produce as much evil in the subsoil as cesspools do now.

The sixth great law of sanitary work is for sewer and water services to be decidedly separated, so that no interchange of either liquid or gases should be possible. It was shown not long since, that just where a water-pipe passed over a sewer, there the pipe was defective, and as a consequence a serious epidemic arose. Sewage soon decomposes iron; and if water-pipes be allowed to lie in sewers, and to occupy portions of cesspits on the roadside, or to be in communication at those points at which water is delivered into a house, and slops and sewage removed, there can be no real safety for the people.

The seventh law is that the individual house is the unit of sanitary work; that it is in each house, and it is with each individual that the first action must be taken to diminish the power of matter from within to grow and produce its kind; whilst, should it be introduced, it is the individual case which is the unit of repression.

ON SANITARY FALLACIES.*

By W. H. Corfield, M.A., M.D.Oxon., F.R.C.P.Lond.,

Professor of Medicine and Public Health at University College, London; Medical Officer of Health for St. George's, Hanover Square.

Against all sanitary improvements whatever, we find one argument continually brought—that things have gone on in the same way for many years, and there is no reason why they should be changed; that our forefathers, from generation to generation, lived under unsanitary conditions, and why should we not do the same? That cholera, or enteric fever, or diphtheria has never broken out in a place, or in a particular house, and so it need not be expected. Such are the forms in which this argument meets us at every turn; but those who use it forget that our forefathers died in those places; they forget that in all places which have been made cleaner, from which refuse matters have been removed more speedily, where over-crowding has been abated, where more efficient drainage arrangements have been carried out, the general death-rate has been lowered. When they say that because such a disease as enteric fever

* Read at the Sanitary Congress at Croydon, October 1879.

has not appeared in a place, therefore it never will; they forget that when cholera or enteric fever is introduced into a place where the conditions are favourable for its spread, where the air is tainted and the water-supply rendered impure with excremental solution; that in that place, although such diseases may have been absent for so long that their existence has been almost forgotten, they will spread like wildfire and decimate the population. They forget, in fact, that people who are living in the midst of general unsanitary conditions are in a worse plight than people living in the crater of an extinct volcano, for not only may any one of the severest epidemic diseases break out among them at any time, but they are continually sacrificing unnecessary victims to the demon filth. I have mentioned some of the communicable fevers. Now what I believe to be an important fallacy still exists in connection with the poisons of these diseases.

It was formerly thought, and was maintained by Trousseau, that the poisons of these diseases might originate anywhere, at any time under suitable conditions; the specious argument being that having arisen somewhere, at some time or another, there is no reason why they should not originate anywhere or at any time. Without entering into the vexed question of the nature of the poison of such diseases, I will merely point out that this belief is now almost universally scouted with regard to the majority of such diseases. How many persons are there who believe that small-pox or scarlet fever, measles or whooping-cough, arise independently of previous cases of these diseases, and yet we find not a few, supported by the weight of great authority, who believe in the spontaneous origination of the poisons of typhus and enteric fevers, of diphtheria and of cholera. The arguments brought forward to support this position are most of them fallacious in the extreme, and I am bound to say that the arguments advanced to prove the *de novo* origination of the poison of enteric fever, are of themselves sufficient to render it in the highest degree improbable. They are indeed so weak that no one really capable of judging the value of a scientific argument, could from them come to any other conclusion than that the position was untenable. But a practical and very serious mischief has arisen from the spread of these doctrines. We are told that enteric fever is not contagious, and we are told distinctly in so many words that it is rarely if ever communicated from person to person. We are told that in the great majority of instances the poison of this disease originates *de novo* in decomposing excremental filth; we are told that the intestinal discharges of patients suffering from this disease do not contain the poison of the disease, although they may be more prone to the special decomposition by which the poison is produced, and the result of all this is that a large number (I will not say the majority, for I hope it is not so) of the medical practitioners throughout the country, take no pains to destroy the poison of this disease at its source—the virus-laden discharge of the intestinal canal. It might be thought that after people were told that living under bad conditions, as regards the removal of filth, would engender enteric fever among them, they would be even more careful to prevent the possibility of its appearance, than if they were told that it would certainly spread if brought to them while living under such conditions; but this is not so, and for the simple reason that the people know well enough that enteric fever does not arise under these conditions; they may be deceived about the general death-rate, but they know perfectly well that a field may have the richest possible soil, may be well-manured and well-watered, but that no wheat will grow in it unless the seed is sown; a place may be in the most unsanitary condition conceivable for many years, and that enteric fever will not spring up in it; and when they are told that it will, they do not recognise this as a fallacy, but jump to the conclusion that the whole of sanitary science is a philosophical fancy not worthy the attention of practical people.

But there is still a great fallacy abroad in connection with the question of the removal of refuse matters in the vicinity of habitations. People talk and write as if the water-carriage system and the conservancy systems stood upon the same footing—the principle of the one being the *immediate* removal of excretal matters from houses, and that of all the others being, as their name indicates, the keeping of such matters in and about the house for a certain time. The one is a correct principle, the other is a false one, and it is no argument at all to say that where the water-carriage system is badly carried out, the result may be worse than where the conservancy system is carefully managed. In sanitary matters, as well as in everything else, we should follow correct principles. If we do not, but by arguments equally specious and fallacious try to persuade ourselves that 'practically speaking' (according to the cant phraseology of the day), better results may be obtained by following false principles, nothing is more certain than that by an inexorable law of nature true principles will assert their position, and we shall be punished for our mistake by being landed in difficulties greater than we had to contend with at the outset. It is a very old and often exposed fallacy to argue against the use of a thing from the abuse of it, and to argue against the water-carriage system because when surface drains have been called upon to do the duty of sewers, for which they were not intended, and of which they are not capable, or because the sewage has been turned into the water-courses, which have thus become unfit to supply water for domestic purposes, is an excellent example of this kind of fallacy. I do not say that a well-managed conservancy system is not better than a badly-managed one, nor far better than no system at all, nor do I say that there are not places where the difficulty of carrying out a water-carriage system is not so great as to be almost, if not quite, insurmountable; but I do say that in towns where a water-carriage system is possible, there is no room for choice in the matter. The mischiefs that have been traced to the water-carriage system have occurred from the abuse of it, and not from the proper use of it. Sewer air, about which so much has been written, is injurious when it is collected in badly ventilated sewers and allowed to escape from them into the houses, but in an impervious sewer with a proper fall, sufficiently flushed and efficiently ventilated, the noxious ingredients of sewer air are scarcely formed at all, and the air of the sewer is hardly appreciably different from that in the street, while its foulness bears no comparison to that of the atmosphere of many inhabited rooms. The proper way to ventilate sewers is to have a sufficient number of openings leading into them from the surface of the roads, as has been demonstrated over and over again, but I see that the ridiculous practice of having, as far as possible, air-tight sewers, and connecting them with the flues of furnaces, notwithstanding that the fallacy of it was exposed by the

Health of Towns Commissioners in 1843, and has been pointed out over and over again ever since, still has its advocates. The Commissioners pointed out that in the first place the action of the furnaces was at times so strong as to draw all the water out of the traps on the house drains, and at other times so ineffectual that the air from the sewers was drawn into the houses through the unsealed traps. They pointed out, too, that in a case where some of the sewers in Battersea had been connected with the furnace of some soap works, on one occasion coal-gas escaped from a main into the sewer (as has frequently happened since, and not so long ago in the neighbourhood of Great George Street, Westminster), and an explosion occurred which blew the works to pieces.

Another important matter in which we are liable to be led astray by false principles, is that of the supply of water for domestic purposes. A man, deservedly eminent in his own branch of medicine, told the public not so long ago, from a position that lent weight to his words, that water-analysts and medical officers of health had all gone wrong about water; that the small quantities of organic matter that were discovered in water were matters of no importance at all; that all water, however pure it was, was contaminated with organic matter as soon as it got into our mouths; that the greater part of our food consisted of organic matter, and that it was ridiculous to condemn a drinking water because it contained small quantities of organic matters. The obvious fallacy of such arguments must be patent to all who have thought upon the subject at all, but to the multitudes who allow others to think for them, such fallacies coming from the mouth of one whose words were entitled to be listened to with respect, were calculated to do a vast amount of mischief. There are organic matters *and* organic matters, and it is not because beef and mutton is good for food that putrifying filth, in however small a quantity, coming from sources likely to be tainted with the poisons of specific diseases is to be tolerated in water for domestic use; and this leads me to speak of a still greater fallacy in connection with the water-supply. We are told that it is not necessary to go to the purest sources for water; we are told that we may take a water that has been once polluted, and filter it to give it to the people to drink, that it is a 'practically wholesome' water, that no harm can be shown to have resulted from it, and so forth, and we are given averages of its composition to prove that it is 'reasonably pure' to be used: but it is not averages we want—we want to know the quality of the worst samples that are supplied. It is ridiculous to tell a man that the average quality of the water given him to drink is good, if on one day in the year he gets water that is 'quite unfit for dietetic purposes'. But the people are awakening to this matter. They will not be put off by such specious arguments and fallacious reasonings, but they will insist on the 'practical' carrying into effect of the true principle as laid down by Mr. John Simon—'It ought to be an absolute condition for a public water-supply that it should be uncontaminable by drainage.'

The fallacies connected with dietetics are very numerous, but as they are associated almost entirely with personal hygiene I shall leave the discussion of them for another place. I must mention, however, the curious fallacy about the nutritive power of gelatine, which owes its origin to the results of some incomplete experiments, and which completely upset for a considerable time the belief of scientific men, and of the public generally, although this was not only correct but backed by the experience of ages, that gelatine was an important article of diet. What really is the place of gelatine among foods I will not discuss now. It is sufficient for me to say that more complete experiments have shown beyond doubt that the ancient experience was reliable, and it is to be hoped that the nonsence about invalids being starved upon jellies and port wine will disappear from our treatises.

With regard to tobacco there is a curious fallacy abroad; although the excessive use of it, as of tea or of coffee, or of any substance that acts directly upon the nervous system, is injurious in various ways, there is no evidence that the moderate use of it is pernicious. Sir John Sinclair, who took pains to investigate this subject carefully, comes to the following conclusion in his admirable *Code of Health*:—'It does not appear that a temperate use of tobacco can be considered as an obstacle to longevity.' On the contrary, the evidence is very distinct that among the old persons available for the investigations, the great majority were smokers, so it might indeed be argued with some show of reason that smoking was favourable to longevity. For instance, out of forty persons above eighty years of age, and living in some of the Western Islands of Scotland, no less a number than thirty (or three-fourths) are reported to have been addicted to the use of tobacco, and of the remaining ten it is probable that some of them followed the same practice, though it was not adverted to at the time. He states that in Greenwich Hospital there were ninety-six men exceeding eighty years of age, of whom thirteen were above ninety and one above 100—'and yet they almost all used tobacco.' He mentions also that of the pensioners in a hospital in Ireland there were 'thirty-one above eighty years of age, all of whom, with the exception of one, were in the habit of using tobacco, and many of them freely.' If I am told that these old men might have lived to a greater age if they had not been smokers, I would rejoin that they, at any rate, lived longer than the non-smokers, and that the argument reminds me of that used by the old lady who said of an inveterate smoker, eighty years of age, 'Ah! but if he hadn't been a smoker he might have been ninety by this time!' The arguments derived from the composition of the tobacco leaf and its smoke are obviously fallacious, and cannot stand for a moment in comparison with the facts ascertained by Sir John Sinclair. I must, however, express my agreement with Dr. Parkes that smoking is an injurious and most undesirable habit for growing lads.

Let me pass now to a subject about which we are all much more likely to be agreed. I refer to the fallacies abroad in connection with small-pox and vaccination, and I must take especial notice of the style of fallacious argument employed by those who try to persuade the people that vaccination is not a preventive of small-pox. It is a style of argument well known of old, and very powerful for mischief. Take the following as an example:—'The decrease in the mortality from small-pox in the latter part of the last century would have continued if vaccination had not been introduced, and would have been more marked than it has been.' Here is a style of argument well calculated to throw even wary people off their guard. The false statement upon which the fallacy rests is not put forward as a statement of fact, but is assumed as something well known, and not to be disputed. 'The decrease in the mor-

tality from small-pox towards the latter end of the last century!' This is the way in which it is put, and nine persons out of ten, at the very least, would not suspect that the statement assumed to be true is the falsest of falsehoods. As a matter of fact, the five most severe epidemics of the last century, each causing a mortality of more than 100 deaths from small-pox out of every 1,000 deaths from all causes, occurred in the latter half of the century, and the most severe epidemic of the century, which caused no less than 184 deaths out of every 1,000 from all causes, occurred in the year 1796! Take another argument of a similar stamp. 'In Prussia everybody was vaccinated and revaccinated, yet Berlin was subject to severe small-pox epidemics like other places, and when small-pox was epidemic there lately the number of deaths in one week was three times as great as in London during the height of the epidemic here.' This statement was made in 1871 in the House of Commons, and at the request of my friend, Mr. George Ferguson, of Cheltenham, who was then carrying on a controversy in a public paper with the chairman of the Anti-Vaccination League, I took pains to investigate the matter. I then found that up to March 1874, there had been no compulsory vaccination laws at all for the civil population in Prussia, the law only *recommending* (!) vaccination, but that in March 1874, the German Government was so impressed by the severity of the epidemics of small-pox in Prussia compared with those in parts of the German Empire where vaccinnation was compulsory, that a law was passed making the vaccination of infants and the re-vaccination of children of riper years compulsory throughout the whole of the German Empire. The Swedish statistics, which have always been pointed to as strongly in favour of vaccination, have been recently manipulated with view of proving the reverse. I have before me the statistics for 124 years. In the 61 years before the practice of vaccination, there was only one year in which the deaths in Sweden from small-pox were less than 1,000, and there were 9 years in which the deaths were over 10,000. In the 63 years during which vaccination was practised, there were 48 years in which the deaths from small-pox were under 1,000, and in no year did they reach 10,000 or even 3,000.

There is another class of diseases, the prevention of which is to a certain extent dealt with by Acts of Parliament, and about these too it seems to me that a serious fallacy is widespread. Whatever many well-minded people may say to the contrary, I must, speaking not only from a sanitary but from a humanitarian point of view, maintain that is not our prerogative to visit the sins of the fathers upon the children, and in answer to the common argument brought against attempts to prevent the spread of these diseases, I would re-echo the words of Dr. Farr: 'Morality, it may be hoped, will be inculcated by higher agencies than enthetic diseases.'

Although I do not mean to enter into a statistical discussion, I will mention one or two serious statistical fallacies that are very prevalent, and out of which much capital is made. We are told that in spite of sanitary improvements the death-rate remains the same: considering that 'the mortality of the City of London was at the rate of 80 per 1,000 in the seventeenth century, and 50 in the eighteenth, against 24 in the present day' (Farr), this statement seems rather audacious. We are also told that the death-rate of London is, and has been for some time, practically stationary, but since the density of the population is increasing, the death-rate ought to be increasing, whereas it is actually diminishing. Dr. Farr shows that the death-rate of London (calculating from its density) ought to be 35·2 per 1,000 per annum, whereas it now is under 23. Again, we are told that the death-rate from zymotic diseases is stationary; but surely the wonder is that it is not increasing rapidly. Yet another statistical fallacy: The death-rate of London is very low indeed; we are positively told that this is due to the influx of healthy lives from the country! whereas, as a matter of fact, they make an almost inappreciable difference in the death-rate.

The annual influx of immigrants forms in time a permanent addition to the population, but as their death-rate (say that of persons over 20 years of age) differs but little from that of the community at large, or from that of persons under 20 years of age, they scarcely affect the general death-rate themselves at all. If we are required to debit London with the deaths of persons under 20 years of age, of whom the immigrants may be said to be the survivors, we must also credit the population of London with the additional population, under 20 years of age, which would result from an annual number of births equal to that of the immigrants, and of the persons under 20 whose deaths we have taken into account. Thus it can be easily shown that the death-rate is hardly affected at all by immigration.

THE UNHEALTHINESS OF PUBLIC INSTITUTIONS.*

By Henry C. Burdett,

Fellow and Member of Council, Sanitary Institute; Author of 'Cottage Hospitals', 'The Pay Hospitals of the World', 'Dwellings of the Poor in large Towns', etc., etc.

The unhealthiness of public institutions is becoming more and more an admitted fact. Hospitals, asylums, schools, to say nothing of convents, refuges, and homes under private management, have of late all shown signs of unhealthiness, which should not exist in such institutions, notwithstanding that people say that sickness exists everywhere, and must therefore be necessarily found in all public institutions! Is this so? We doubt this postulate, and for the following reason:—Since the prisons of this country have come under the control of Government, they have gradually been made probably the healthiest residences in the United Kingdom. Dr. Gover, the Medical Inspector of Prisons, in his 'Notes', attached to the second report of the Prison Commissioners, gives incontrovertible evidence of the truth of this fact. He proves that in all the prisons of England and Wales, during one entire year, only one case of small-pox, and not a single case of scarlet, or typhus, or gaol fever occurred What a contrast to the old days when gaol fever was so alarmingly fatal to prisoners, judges, juries, and indeed to all who had business at the criminal courts, that history too often marks its ravages in certain towns by recording there a black assize. Again, only fourteen cases of typhoid fever are reported by Dr. Gover, five of which occurred in one prison, in an infected district. In the majority of the prisons there was not a single case of typhoid fever throughout the year. In the fourteen cases reported, the origin of the disease was invariably traced to sanitary defects, which were proved to have been in existence before the Government had

* Read at the Sanitary Congress at Croydon, October 1879.

control of these establishments. It is, therefore, reasonable to hope, that during the present year typhoid fever will also be banished from all the prisons. Why should such a desirable guarantee of health be confined to the occupants of prisons? Before giving the reasons for this startling anomaly, it may be well to state that only typical and published proofs of the unhealthiness of the great majority of public institutions and its causes will be given in this paper. A departure from this rule would necessitate an abuse of confidence which would be neither politic nor just. Again, no detailed remedy will be suggested, because the necessities of each institution will require separate consideration, and, probably, distinct treatment.

Having said so much by way of preface, to obviate misunderstanding, I proceed to ask why, in the face of the facts stated by Dr. Gover, do the authorities of other public institutions look upon the presence of a certain number of cases of zymotic disease as unavoidable? They must believe this to be a sound position, or it would not be possible to record such cases as the following:—The Manchester Infirmary, one of the oldest, largest, and most important of provincial hospitals, was, less than three years ago, declared, by Mr. Netten Radcliffe, to be 'unhealthy from cellar to garret'.* Its sanitary condition is bad. Yet the authorities of this institution had been warned, over and over again, during a series of years, by outbreaks of pyæmia, erysipelas, and other traumatic affections, that something must be wrong. But, some one may say, why should such outbreaks be taken as showing the insanitary condition of a building? I answer, sewer gas has been proved to be a prolific cause of erysipelas, and it is now shown to cause much pyæmia in hospitals. I will not now give evidence of the truth of the former statement. I have never heard it contradicted. But of sewer gas as a cause of pyæmia, I would say that the following instance seems to prove the case beyond dispute. Pyæmia occurred in the chief surgical ward of a large hospital three years ago. This ward was built upon the pavilion principle, and was quite separate from all the other hospital buildings. Some thirty patients were affected in a few weeks, and so violent was the outbreak that the surgeons declined to operate. At that time the sewers were unventilated, and all soil pipes were in direct communication with the sewers. No sooner, however, were these defects remedied, than pyæmia entirely disappeared. No other cases of pyæmia occurred for six months, when, all of a sudden, the disease again appeared in a virulent form. As it continued, the ventilating shafts from the soil pipes were examined carefully, and it was discovered that they were stopped up. Some workmen had been engaged on the roof, and as they objected to the smell from the ventilators, had closed them with pieces of rag. This is a proof of the necessity of a regular inspection of all ventilating shafts, open soil pipes, etc., etc. Of course, the ventilators were at once put into working order. Since then, during two whole years, the disease has almost disappeared from the hospital. In this connection it is fair to give expression to the conviction, which is founded upon observations during many years' residence in a hospital, that had not Mr. Lister introduced the antiseptic system of dressings, several of the older hospitals must have been closed long ago.

Now it has been shown that one of the oldest and most important of provincial infirmaries proved on investigation to be unhealthy from cellar to garret. It has further been shown that sewer gas is a prolific cause of pyæmia and erysipelas. It remains to connect cause and effect. On examination and inquiry it was found that no one connected with the management of the Manchester Infirmary could give Mr. Radcliffe, the Government Inspector, any reliable information as to the drainage arrangements of the building. In fact, excavations had to be made here and there to ascertain the exact condition of drainage affairs. Alarming and astonishing as this statement may appear, its effect will be increased a hundred-fold by the declaration that investigation has brought to light that not 10, and possibly not 5, per cent. of all the hospitals throughout Great Britain and Ireland possess any *reliable* plan of their drainage arrangements. Even some of the most important hospitals in the kingdom have no such plans, and it would be easy to give instance after instance of the culpable ignorance which prevails on this important subject. What then is the probable condition of the drains of an institution built it may be fifty years ago? Remembering the action of sewer gas upon hospital patients, and considering the only answer that can be given to this question, is it much use fighting about the comparative healthiness of different medical charities until so crying an evil is redressed. For my own part, I have no doubt that hospitals where the antiseptic system is enforced can be made as healthy as the prisons to which reference has already been made. Hospitals belong to a class of institutions which ought to be specially provided with adequate sanitary arrangements. The unhealthiness of such institutions is a serious matter, because it not only places in jeopardy the reputation of the medical staff, but the lives of many thousands of the people. It cannot therefore be doubted that if the attention of the committees of these institutions is once aroused to the importance of having an adequate system of drainage, a remedy will speedily be forthcoming.

Turning now to the health arrangements of the large lunatic asylums of this country, a fair insight may be gained into their condition by recalling the evidence recently given at Frome before the Somersetshire coroner.* From this evidence it appears, that from December 1878 to May 1879, 32 cases of spontaneous erysipelas occurred amongst the inmates of the county lunatic asylum. Of these, 23 cases broke out in the female infirmary ward, and nine on the male side. Of the whole number four died. At the time of this outbreak complaints of ill health were made by very many other patients. Nausea, headache, sore throat, and general malaise were long prevalent, and these symptoms were followed by an epidemic of diarrhœa. Bad smells were noticed in all parts of the building, and it soon became evident that sewer gas was almost everywhere present throughout the asylum. The medical superintendent, Dr. Medlicott, had his suspicions aroused, and a thorough overhauling of the drainage arrangements took place. These investigations disclosed the following instructive facts. None of the soil pipes were ventilated. Most of them were of lead, and several were rat-eaten, and riddled with holes. On taking out the pan and syphon of the infirmary water-closet a hole in the soil pipe 3 by 1½ inches was discovered. This soil pipe communicated

* Sanitary Record, vol. x, p. 371.

* Sanitary Record, vol. x, p. 357.

directly with the main sewer. The main drain outside the infirmary ward, where two-thirds of the erysipelas cases occurred, had been choked more than once during the year, on one occasion to the extent of from three to four yards. In consequence of an insufficient fall the main drain had been stopped several times. Thus, it is clear that for months, and probably in an increasing degree for years, the inmates of this county lunatic asylum had been subjected to the influence of gases, generated by fermenting sewage, which were constantly brought to the interior of all parts of the institution by the unventilated soil pipes, from which poisonous vapours were admitted within the buildings, through the rat holes above described. No wonder the jury declared that the erysipelas was proved to be due to an escape of sewer gas, owing to insecure and insanitary drainage arrangements. How many lunatic asylums in different parts of the country are liable to a similar outbreak of erysipelas for like reasons?

Uppingham Grammar School is a typical instance of the dangers arising from defective drainage at the public schools. The experience at this school was sharp and decisive, and it has tended to arouse the authorities of several other large schools to active exertion. But who can say how many masters and governors of semi-public schools and colleges are ignorant of the present state of their drainage systems? If we include private schools, the sanitary condition of the buildings used as school houses must often be terribly deficient.

I have not the space to give my experience of the hygienic (?) surroundings of convents, refuges, homes, and other like charities. I shall, therefore, content myself with the observation that the conclusions I am forced to draw from investigations I have been making in Dublin during the past few weeks, strengthen the conviction I had already formed on the subject. This conviction is, that if the unfortunate inmates of these religious and charitable institutions often suffer cruel hardships at the hands of those who have charge of their management, the sanitary arrangements, for the most part, of such buildings, must render residence within their walls highly dangerous to health.

Finally, I do not think it is too strong a statement to say that the probabilities are decidedly against there being one in ten of such institutions that would stand an impartial investigation into its drainage arrangements without producing as startling revelations as those made at Manchester and Frome.

The facts I have here given—facts selected from a number of instances I have collected during the past few years—abundantly bear out the assertions of Dr. Buchanan. Speaking of improper connections between sewers and buildings, he declares that in this way the air of sewers is laid on to the houses. The larger the house, the greater is the danger, as, unless the drainage and plumbers' work have been executed in the most perfect manner, every bath, every lavatory, every sink, and every waste-pipe is an additional danger'. How fully the experience of the Somerset County Asylum bears out the truth of Dr. Buchanan's words! What, then, is to be done? Is it longer to be tolerated that the lives of many innocent persons, who, from being placed in these public institutions, are powerless to help themselves, shall be annually sacrificed because no adequate drainage arrangements exist in the majority of such buildings? The answer to such a question cannot be uncertain. The moral is plain to read, but difficult to get applied: First, let every responsible person who is connected with any public institution take the facts here adduced to heart. Let every committee, or council, or board of governors at the next meeting, ask for a plan of the drainage arrangements of the hospital, or asylum, or school in their charge. If this is forthcoming, let there be no loss of time *in testing its accuracy* and, under any circumstances, let them procure a report from a competent expert of the exact sanitary condition of all the buildings in their charge. In this way the truth can alone be ascertained. If the authorities longer neglect so plain a duty, it will not be unreasonable for a jury to bring in a verdict of manslaughter should any deaths be produced in future by sewer gas, from causes similar to those exposed at the County Asylum at Frome. With the report of Dr. Gover before them, the managers of all public institutions ought to take courage, because such a report shows that preventive medicine is a great fact. Experience has now proved, that sometimes science can point to such unanswerable evidence, with the proud assertion, prevention is better than cure. It is a scandal that the insanitary condition of so many private houses is the origin of so much avoidable disease. It is a disgrace that any public institution should be without a reliable plan of its drainage, or a perfect system of hygiene. How much longer is it to be possible to declare, that if a man is really anxious to guarantee to himself six months' perfect immunity from preventible disease, he must get committed to one of Her Majesty's prisons? And why? Because private houses and public institutions are not free from preventible impurities, whilst lodgings, and even hospitals, are too often, compared with prisons, highly dangerous abodes for any one who has a tendency to zymotic disease. In Ireland, most of the public institutions are in part supported by Government grants. In England and Scotland, this is seldom the case. Still, Government grant, or no Government grant, adequate sanitary precautions ought to be taken at all public institutions, to protect the lives of the inmates. No permanent reform is likely to be enforced without a thorough, and independent, and periodical inspection of all the structural and drainage arrangements of these buildings. It would, therefore, be a great public gain if a special sanitary inspector could be appointed, whose whole time should be devoted to the inspection of the sanitary arrangements of public institutions, good, bad, and indifferent. Will the Congress support this view by resolution? Such a recommendation to the Local Government Board would not be invidious; because the managers of these institutions are becoming more and more alive to the sanitary difficulties which have to be overcome. Hence, the institutions would willingly welcome the help, and follow the guidance of such an expert. The managers of these institutions pay handsomely for a periodical inspection of the boilers and machinery in these buildings, because they appreciate its value. The sanitary inspector would be more welcome still, because he would not only reduce expenditure, but he would increase the health of all the inmates. At any rate, the compulsory registration of the plans of all public or semi-public buildings is a much needed reform.

URBAN BYE-LAWS REFERRING TO NEW BUILDINGS IN RURAL DISTRICTS.

By John Aldersey Davenport,

Surveyor to the Nantwich Rural Sanitary Authority.

Under the powers of section 276 of the Public Health Act, 1875, the Local Government Board may, on the application of the Authority of any rural district, or of persons rated to the relief of the poor, the assessment of whose hereditaments amounts at the least to one-tenth of the net rateable value of such district, or of any contributory place therein, by their order declare any provisions of the Act in force in urban districts to be in force in such rural district or contributory place, and may invest such Authority with all or any of the powers, rights, duties, capacities, liabilities, and obligations of an urban Authority under the Act. Various applications have been made to the Local Government Board to confer these powers on rural authorities, and occasionally an announcement may be seen that urban powers for particular purposes have been conferred on rural authorities with respect to certain contributory places within their district. I am not aware of any rural authority having been completely furnished with these urban powers, so that it is clear that some exceptional circumstances will have to be shown with respect to particular contributory places before such powers can be granted. The nearer such contributory places approach in their character to urban districts the more likely to be successful will any such application be.

The most important of these urban powers relates to the making of 'bye-laws' as regards new buildings, in which are dealt with most important matters, such as the structure of walls, foundations, roofs, and chimneys, sufficiency of space about buildings to secure a free circulation of air, ventilation, drainage, water closets, earth closets, privies, and ashpits, cesspools, etc. That attention to these matters in essentially urban districts is a vital matter there can be no disputing, and I will venture to state that it is a vital matter also in essentially rural districts, for no one who has, like myself, to visit large numbers of rural houses can fail to be struck with the great desirability of there being some power to direct and control the sanitary ignorance that prevails. It is discouraging enough at times to have to contend with these unsanitary arrangements, which have hitherto so generally abounded in the country; but it is doubly discouraging to see new houses rising up with the same evils, which have to be subsequently grappled with. The Nantwich Rural Sanitary Authority have been invested with urban powers as regards new buildings in six of the largest townships within their district; but in upwards of sixty of their townships the building bye-laws do not apply, and consequently houses within a few yards of each other may have some to be built under the bye-laws and others not. Since these powers were conferred the plans of all new buildings have had of course to be approved by the sanitary authority before their erection could be commenced in the special districts alluded to, and in the three and a half years since the first plans were received plans of nearly four hundred new buildings have been laid before the Authority and have been passed. This means that some four hundred houses have been built on proper foundations; that damp courses have been introduced into their walls; that their ground floors have been laid at a proper level, and ample space left unbuilt upon about them; that each room has an opening window of suitable size, and that the ventilation is sufficient; that the best drainage that was practicable has been laid for the convenience of each house; that proper pipes and traps have been used; that the drains are properly ventilated, and that the dwelling is not in direct communication with them; that the subsoil will be drained if necessary, and that properly constructed ashpits and privies or earth closets have been erected at a sufficient distance from the dwellings, or, if water-closets are provided, that they are suitably situated and duly ventilated; that other necessary outbuildings are suitably placed; and that each dwelling has the best obtainable water supply. All these new regulations having been introduced into townships which, after all, are principally rural in their character, it may be asked how far difficulties were experienced in carrying them out. On only one point, and in only one township, has there been really anything in any district that could be called grumbling. That was at a place called Church Coppenhall, and arose in consequence of the bye-law which had the effect of prohibiting party and external walls being less than nine inches in thickness. It was asserted that in the adjacent borough of Crewe four and a half inch party walls were always allowed, and that four and a half inch temporary external walls were also allowed where there was an intention declared to build again up to them in the future. That this declared intention was not, however, always carried out subsequently was admitted, and thus practically four and a half external walls are allowed in Crewe, there being really no power at all to compel adjoining owners to build up to the four and a half inch gables that may have been battling with the weather for years previously. It will readily be seen how external walls of four and a half inches only may really become permanent, and even where the rows of houses are continuous, the party walls being only four and a half inches in thickness, and the houses often sold to different persons, there will be only a four and a half inch wall between one person's property and another.

Crewe is comparatively a new town. Its growth has been very rapid, and it has no doubt been a splendid field for the men who build houses 'to sell'. That the 'speculative' interest should make itself felt on the local board was no great matter of wonder. It was also not surprising, so intimately is Church Coppenhall connected with Crewe, that the imposition of restrictions as to the building of walls, such as I have named, should create some discontent in the former township, because on one side of the narrow brook that divides the two the speculative interest was triumphant, and four and a half inch walls, party and external, were tolerated, whilst on the other neither were allowed, and considerably more expense would necessarily be incurred in the erection of new buildings.

A deputation from Church Coppenhall came before the rural sanitary authority to point out this grievance, and to show that in fact we were stricter than in 'the important town' of Crewe, and that we should drive all the new building out of Church Coppenhall. The sanitary authority, however, held firm to their bye-law, and with some threats of not going on with the proposed buildings, active opposition ceased. The houses, however, that were then in question are built and occupied, and members of the very same deputation have admitted that they are well satisfied with the buildings they have put up. That the contrast in the building regulations

between Crewe and Church Coppenhall should still continue rather a sore point with those who build houses on the speculation of selling them and making as much as possible out of them may be very easily understood; indeed, it would not be natural if it did not, since it touches the most sensitive considerations, viz., the pocket and the profit. From those whose interests are directly interfered with, manifestations of this soreness may no doubt, under the circumstances, at times be looked for. It is not, however, altogether the interests of speculators in buildings that a sanitary authority has to consider, but the interests of those who are compelled to live in the houses they build, and with these the interests of subsequent purchasers are also connected. With this exception, there is no grumbling of any importance. All plans continue to be submitted in accordance with the bye-laws as a matter of course, and everything, as a rule, works very smoothly and pleasantly in each of the townships; in Church Coppenhall alone nearly 150 houses have been, or are being, built, in spite of the obnoxious bye-law as to walls. Nothing is required but what actually improves the property, and houses with good arrangements will always command tenants. There is thus less likelihood of loss of interest from the dwellings remaining empty, whereas jerry-built, ill-arranged ones, without proper drainage and conveniences, are often empty, and even when occupied, the rent is not quite so certain. There is, in fact, not that choice of tenants to be had such as there is with the better arranged houses and premises. The chief difficulty that remains now with respect to the submitting of plans for approval is that of making the more 'rural rurals' quite understand what is required. I had an interview with an individual a short time ago as to the erection of some new buildings. Having given printed instructions, building notice, etc., and as clear verbal directions as I could, I found as a result a letter marked '*With speed*', containing a request that I would submit the enclosed plan for the authority's approval, and '*do my best*' for the writer. On referring to the plan, I found a scrawl on half a sheet of note-paper that would have done credit to an intelligent '*five-year-old*', and after the fashion of the limners that we have read of in ages past, there was inscribed under each separate building, the outlines of which had received no ruler's aid, '*This is a shippon*', '*This is a Byng*', '*This is a stable*', and so on. Amateur architects, too, sometimes forget windows and doors in their plans, which causes inconvenience. Sometimes we are informed on a plan 'drainage is not necessary'. One old lady was very pertinacious, and visited me regularly for a while to induce me to forego the necessity of 'Plans' in her case. When she found, however, that she must get some plans drawn and submit them, she became quite happy, and is about submitting plans for further houses. There are sure to be little difficulties with respect to the introduction of any new system, but as time goes on and people become more fully acquainted with the details of what is required, all this will work smoothly enough. What I desire to make clear is, that whilst very beneficial results are certain to arise in whatever districts new buildings are erected under good bye-laws, there are practically no hardships to make them press unduly upon intending builders of houses, and that really no well-founded complaint has ever been urged against them. True, their requirements may, in the first instance, cost a little more money, but, as has been stated before, this is almost certain to be more than balanced in the long run by the greater absence of the usual risks of tenancy, to say nothing of the question of stability and repairs. In the event of fire, too, where two or more houses are together, this may be much more easily kept in limits with nine-inch party walls than with 4½-inch walls, where timbers may run through.

If, then, the experience of this district can be borne out by that of other rural districts, and it is the fact that there are no more hardships or difficulties connected with the introduction of building bye-laws than may naturally be expected from the introduction of any new system, why, may I ask, should not building bye-laws be in force in every township, and every new house have the advantage of being built under them? The introduction of even 400 new houses, with fair sanitary arrangements, scattered over a rural district, cannot fail to have some influence for good, for custom is a fashion which always has its imitators. I remember a case in point with respect to water-tanks in a township where the wells are strongly impregnated with salt. We caused storage tanks to be erected in new houses, and the example was followed without further trouble on our part. In the same way, other arrangements are copied in the alterations of houses built prior to the bye-laws coming into force, and this is an assistance in every way. But if the introduction of a number of houses with fairly good arrangements in certain districts be beneficial, what an advance would be given to sanitary work if *every* new house were obliged to be built with due regard to proper sanitary arrangements! I feel sure it would be pecuniarily beneficial to owners of new houses in another way, for it has often happened to me that I have had to serve notices with respect to new houses erected where building bye-laws are not in force, as soon as the houses have become tenanted. I could refer to twenty houses in one township which now has building bye-laws, the houses being completed shortly before the bye-laws came into force, and where the owner had to be summoned three times before the magistrates, and was put to great expense in alterations and costs, before his houses were anything approaching to passable. Even now they are very far from being what they ought to be. Bedroom windows were not constructed to open, the privies were terrible nuisances, a ditch close to the houses was the receptacle of all the sewage, which, moreover, actually penetrated to a water-pit from which the whole of the twenty houses, and about ten others, obtained their drinking supply. The same person has since built twelve houses under the bye-laws without a murmur, and would have saved something substantial if his first twenty houses had been built under them, the alterations costing more than the original requirements would have done. I could point also to a house lately built with 4½-inch external walls in another township, with not a window constructed to open, and other arrangements equally bad; and to houses in another township in which drains led from the slopstones (within the houses) directly to the ashpits at the back of the closets, which were close to the houses. There being no drain from the ashpit, the foul liquid soon returned after reaching a certain elevation in the ashpit, and the well for the water-supply of the houses was placed only two or three yards below the privies, the soil being light, and the closets and ashpits not water-tight. Other cases might be pointed out, to say nothing of the general want of damp courses, low-lying and damp floors, and the like. Even where we have bye-laws,

I have had to threaten bricklayers engaged on the work for omitting damp courses. In many cases these bricklayers are the architects, builders, and general advisers of the owners, and having been accustomed to one particular plan, are anything but pleased to be put out of it. The feeding of pigs immediately out of the door of the house, and similar nastinesses, are arrangements of *convenience* in their eyes superior to every other consideration. Houses, too, are put in situations where decent drainage is impossible, and very many things are done which cannot be afterwards rectified, but which might very easily have been avoided at first under proper regulations. Even after plans have been passed as in conformity with the requirements of the law, it is no easy matter to get them always executed in entire conformity thereto, and much careful supervision is required, and much trouble and anxiety caused before everything is complete. There is no doubt that there are frequently covered-up defects which we do not see, and which, in a large district, it is impossible to inspect at the proper time. 'Slurring over the work' is tried on, ventilators and traps are wanting, drainage is ill-constructed, and I have myself found very frequently all these and such like difficulties, which are as formidable to the owner as to the surveyor; for it must be observed that the fault of such things by no means often rests with the owner; and so the supervision of the surveyor is often a safeguard and a boon to him. Still, if such things can occur where there is some supervision, what is likely to be the result when the rural bricklayer is free of all control? Nine men out of ten who are about to erect houses have but a superficial knowledge of building, and know still less of sanitary requirements. An architect is seldom employed in the construction, at all events, of cottages, and so the rural bricklayer is master of the situation.

I have not entered upon the question of the present condition of rural cottages in this paper, for that is pretty well known from published reports, and the need of a change in many respects is generally admitted. I have not gone into calculations to prove that houses with proper sanitary arrangements can be built under bye-laws without loss being incurred, because I have thought it more important to show that such houses are being built continually, and that without complaint (except as before mentioned) from those who are erecting them. I say without complaint, for if there had been any substantial grievances, I should have had them detailed to me to the full.

I think it may be pretty safely said, therefore, that as a matter of fact, there is not much practical difficulty experienced from the introduction of these bye-laws, whilst comfort in the occupation of the houses erected is very materially increased. Thus this is really a '*people's question*', for they are the occupiers, and it is to their great interest that they should have healthy and comfortable homes. On their account, then, is it so important that there should be proper supervision in the erection of their homes; and if it can be proved, as I think may easily be done, that the health of the people depends greatly upon it, that the presence or absence of proper arrangements has a great influence upon their moral and spiritual well-being (vice generally reigning where the home repels instead of allures); that people erecting house property are not really injuriously affected by such interference and supervision, but the contrary; that it is much cheaper to erect, in the first instance, under proper bye-laws than to have to amend and alter subsequently under the provisions of the Public Health Act, a course which is often at the best very unsatisfactory in its result, whilst it is much more unpleasant both to owner and sanitary official; it seems to me that a strong case can be made out in favour of powers being given to all rural sanitary authorities to make bye-laws for the whole of the townships within the area of their district, as to the erection of new buildings and the exercise of proper supervision in connection with the same. There remains little more than the interests of speculators, the natural dislike of John Bull to be interfered with, even though he be in the wrong, and perhaps some sentimental feeling for '*the good old past*', to weigh against the great advantages that have been named, and the inquiry may well be made as to how long the Local Government Board or the Legislature will permit the interests of the speculative class and the other considerations mentioned, to outweigh the important advantages to be gained by the proposed change, in which are bound up the health and the moral, social, and it may be said also, to a great extent, the religious welfare of the people.

SELF-ACTING INTERMITTENT SYPHONS,

AND THE CONDITIONS WHICH DETERMINE THE COMMENCEMENT OF THEIR ACTION.*

By Rogers Field, B.A. M.Inst., C.E.

Before proceeding to describe the peculiarities of this syphon, it will be well to say a few words generally as to self-acting syphons, employed for the intermittent discharge of fluids from vessels. The idea of employing syphons in this way is by no means new, and I may instance the philosophical toy called 'Tantalus' cup', which many of us have seen in our youth. In this cup there is a concealed syphon, which is brought into action when the cup is raised to the mouth to drink, so that the water sinks away from the lips and cannot be drunk. A self-acting syphon has also been employed for emptying vessels used for measuring water, as in Osler's and Bickley's self-recording rain-guages, as well as on a large scale for reservoirs.

The chief difficulty to be overcome in applying syphons in this way is to start them or put them in action. In an ordinary syphon, such as that shown in fig. 1, the syphon will not be put into action unless the water in the vessel rises above the top of the bend of the syphon, and it will be readily seen that if the syphon is of any size this will require a large accession of water in the tank, so that the syphon will not work except in cases where there is a large flow of water.

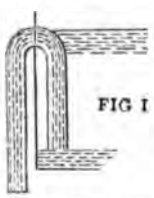


FIG 1

This difficulty can to a considerable extent be overcome by dipping the outer leg of the syphon in water as shown in fig. 2; the water which runs over the bend of the syphon will then drag a certain quantity of air with it and drive this air out at the lower mouth of the syphon, and, as the air cannot return in consequence of this mouth being sealed, the air in the outer leg is gradually reduced in

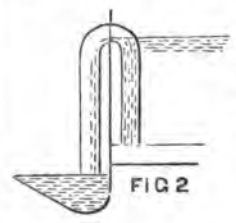


FIG 2

* Paper read before the Mechanical Section of the British Association at Sheffield.

tension below the atmospheric pressure. Whether this partial exhaustion of the air in the outer leg is sufficient to start the syphon depends on the quantity of water that runs over the syphon, but the quantity required will be much less than if the outer end were open, and it will not be necessary for the water in the vessel to rise above the top of the bend of the syphon.

Although the expedient of dipping the outer leg of the syphon in water greatly reduces the quantity necessary to start the syphon, the required quantity is still very considerable if the syphon is of any size, and further expedients have therefore been adopted to reduce this quantity. One of the simplest of these expedients is to have two syphons of different sizes connected together by a tube at the crown, and so arranged that the water runs through the smaller syphon first. The outer ends of both syphons are dipped into water, the smaller syphon then starts with a comparatively small quantity, and afterwards, by means of the connecting tube, exhausts the air from the larger syphon and brings it also into action. This method was adopted by Professor James Thompson, F.R.S., in 1860, for his jet-pump, and it was also carried out on a large scale in France in 1867, at the Réservoir de Mettersheim. In this latter case there are two syphons of about 28 inches in diameter, each of which is put into action by a smaller syphon of 6 inches in diameter.

This expedient, however, and several others which have been adopted, leave much to be desired, as they are to a certain extent complicated, and yet do. not sufficiently reduce the quantity required for starting the syphon to enable it to be used in many cases. The method which I am now about to describe is both simpler and much more effective.

In an extensive series of experiments which I tried some years ago on syphons, with their outer legs dipped in water, I was much puzzled by finding that the quantity of water necessary to put a syphon of given size into action varied in the most unaccountable way at different times. The only difference that could be perceived between the cases in which the syphon started and those in which it did not start was, that in the former case air-bubbles escaped freely at the mouth of the syphon, whereas in the latter case, under apparently the same conditions, very few bubbles came out. At last the idea suggested itself to me of making a portion of the syphon in glass, so as to see what was going on inside the pipe, when the cause of the irregularity was at once discovered. Sometimes the water which ran over the bend adhered closely to the sides of the pipe, at other times a portion of it would fall more or less clear of the sides. When the water adhered to the sides it produced very little effect in displacing the air, so that only a small quantity of air was driven through the water at the mouth of the syphon; when, on the other hand, the water fell clear of the sides, it produced a great effect in displacing the air, and large bubbles of air at once escaped from the mouth of the syphon. I pursued the investigation further by producing artificial irregularities in the pipe, and I then found the more completely I could throw the water clear of the sides of the pipe, the greater effect it produced in expelling the air and starting the syphon. The form of syphon which I have finally adopted as most effective is shown in fig. 3 and in the working model.

The syphon consists of two concentric tubes, A and B, the outer one, A, being closed at the top, and steadied and supported by three radial ribs projecting from the inner tube B. The annular space between A and B

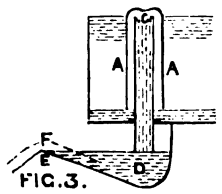


FIG.3.

constitutes the ascending or shorter leg of the syphon, and the inner tube B the descending or longer leg. At the upper mouth of B is fixed a conical shell, C, projecting inwards clear from the inner surface of the tube B. The lower mouth of B dips into a discharging trough, D, which has a weir E level with this lower mouth. The action is as follows:—When the vessel is full the water begins to trickle over the edge of the conical shell, C, and is so directed by the shell as to fall towards the centre of the tube B quite clear of the sides, thus producing the maximum effect in displacing the air. The action of the syphon soon commences, and continues till the water in the tank is lowered to the level of the lower mouth of A, after which air is admitted by that mouth to the syphon and the action ceases.

In some cases the quantity of air admitted at the end of the discharge, though sufficient to stop the syphon, is not sufficient to fully charge it with air, so that the next discharge will commence before the water in the vessel has risen to its full height. To obviate this, the best expedient is a secondary syphon, F, fixed in the trough, D, and put into action by the discharge from the larger syphon, A, B. When this discharge has stopped, the syphon, F, continues in operation, so that the water in the trough, D, is drawn off, the lower mouth of the pipe, B, unsealed, and the larger syphon fully charged with air. Presently, also, the action of the secondary syphon, F, is also stopped by the admission of air. When the vessel is filled and water trickles over the shell, C, the trough, D, is again filled up to the level of the weir, and the syphon, A, B, becomes sealed.

There are other minor conditions which affect the commencement of the automatic action of the syphon, such as the roughness of the top of the conical shell, C, the ratio of the area of the tank to the area of the syphon, the length of the syphon, etc.; but these I will not go into.

In conclusion, it is evident that the above form of self-acting syphon will be of great practical use for a number of purposes. I will merely mention one, namely, that of flushing sewers by means of small quantities of water which ordinarily runs to waste. Take, for instance, a drinking fountain; the water which escapes from it is, under ordinary circumstances, absolutely useless for flushing purposes. Collect this water, however, in a tank with a large self-acting syphon, and as soon as the tank is full, be it in one day or in several days, the syphon will be brought into action, and the contents of the tank discharged with great rapidity. The trickle from a drinking fountain would start a syphon of as much as ten or twelve inches in diameter of the improved form, and would therefore flush a sewer of considerable size, say nearly three feet in diameter.

A man, his wife, and two children, have died at Leighton Buzzard of remittent fever, occasioned, it is stated, by the drinking of impure water.

A committee has been formed in Manchester for the purpose of considering the most practicable methods of improving the construction and the sanitary arrangements of cottage houses in Manchester and Salford.

THE WINTER CLIMATE OF SOME HEALTH RESORTS.

By JOHN W. TRIPE, M.D.,

Secretary to the Meteorological Society and Medical Officer of Health for Hackney, etc.

(*Continued from vol. x, p.* 17.)

ST. MARY'S, SCILLY ISLANDS, PENZANCE, FALMOUTH, AND CHANNEL ISLANDS.

THE Scilly Islands* are situated about twenty-five miles from Land's End and forty-two from Penzance, and possess the most equable winter temperature in the British Islands, if not in all Europe. The mean temperature of the five winter months was 47.9°, against 45.8° for Penzance, 45.0° for Falmouth, and 41.3° for London, so that it was 6.3° higher than for London. This, however, in no way represents the greatest advantage possessed by these three localities over an inland place, as the mean for December at St. Mary's was 47.1°, at Penzance 45.3°, Falmouth 43.6°, and in London 39.6°. In January the difference was nearly as great, the mean temperature for the Scilly Islands being 47.1°, and for London 41.5°, whilst in February it was greater still, being 46.9° at St. Mary's and 39.8° in London; the temperature of Penzance and Falmouth being intermediate. In March, again, the most trying month in the year for invalids, the difference was less, the means being 47.5° in Scilly, 45.3° in Penzance, 45.5° in Falmouth, and 42.3° in London. It is somewhat worthy of remark that the January temperature at all these places, especially in London, was higher than that of December during these years. The means of all the highest temperatures were as follows: at St. Mary's 50.5°, at Penzance 48.6°, and at London 46.9°; the mean of the lowest was 44.5° at St. Mary's, 42.6° at Penzance, and 35.9° in London, which shows the immense superiority of the Cornish climate. The mean daily range, which is one of the most important elements of climate, was the same for St. Mary's and Penzance, viz., 6.0°, whilst for London it was as much as 11.0°. The mean of the extreme range in each month was more favourable still, having been 18.7° in St. Mary's, 21.3° at Penzance, 19.8° at Falmouth, and 32.9° in London. The number of days on which the wind blew from the various quarters was essentially the same at all places, except when calms prevailed, as there were 56 days at St. Mary's on which the wind blew from the north or east, and 90 from the south and west, against 57 and 94 at Penzance, and 58 and 93 in London. It is therefore evident that the chief point for consideration as to the prevailing winds at a locality is the protection afforded by high land against the easterly and north-easterly winds, which are so injurious in this country; or, if open to the east, whether or not there is a free exposure to the sea, which tempers the sharpness of even this wind.

The mean humidity of these seaside places during winter was below that of Camden Town, and more decidedly below that of the air in Regent's Park. This is what few would have expected, but with the exception of St. Mary's, where it was 89, against 88 at Camden Town (saturation being 100), it was less at all the other stations, viz., at Guernsey 85, Barnstaple 86, Llandudno 81, Falmouth 84, Ramsgate 86, and Cannes, on the Mediterranean, only 70.1. This is an important point, because the humidity of seaside places is often referred to as setting up a beneficial action on the irritated membranes of the lungs and throat. The fact is that the average rainfall of a place is too often considered to correspond with its humidity; but that this is not the case is shown by the rainfall at Guernsey being on an average 20.10 inches during the five winter months, against 10.08 inches in London; the humidity of Guernsey having been 85, and of London 88. A more extended investigation into the comparative moisture of the air at inland and seaside localities during the winter months has shown that practically there is no difference, as the humidity is somewhat in excess in December at inland places, and a little in excess at most seaside places in the other winter months. It is therefore an error to describe the air of seaside places in winter as far more moist than that of inland localities.

One of the great drawbacks to a residence in the vicinity of Land's End is the large amount of rainfall and the number of rainy days; but when the soil is gravelly or chalky this is not of such great moment, as the wet soon dries up. Thus, the average rainfall in London for these five months was 10.08 inches, at Scilly 17.14 inches, at Penzance 23.54 inches, and at Falmouth nearly as much. The number of rainy days out of the 152 was 83 in London and 106 in Scilly, and probably about the same at Penzance, but of this I could not obtain a satisfactory record.

The great advantage of the climate of these places over others in the British Isles consists in the comparatively slight diminution of the night temperature. Thus, the average of the mean lowest temperature at Penzance for the five months was 42.6°, and the mean temperature 45.8°, showing an average reduction of the night temperature amounting to only 3.2, and at St. Mary's of 3.4°. The latter place also had the advantage of a mean minimum temperature 1.9° above that of Penzance, viz., 44.5°, whilst in London the mean night temperature was 35.9°, or nearly 9° less. The great drawback to Penzance and Falmouth is that they are not sufficiently protected from winds, so that both, Falmouth especially, are not suitable for consumptives in February and March; on the other hand, during the prevalence of south and south-west gales the warmth and softness of the air is described as being most delightful, and quite unlike an English climate, so that in December and January, when these winds are shown by the tables to be by far the most prevalent, the climate is especially suitable for invalids. I was told by a resident that the winter is so mild in Scilly that frost is unknown there, which is more than, so far as I know, can be said of any other place in Great Britain.

Penzance is situated in Mount's Bay, about ten miles from the Land's End, has an easterly aspect, and is slightly protected from the westerly gales, but from these only. Although so much rain falls, yet, as it alternates with fine sunshiny weather, the winter is more enjoyable than might have been expected from the rainfall observations. It is also worthy of note that as regards the night temperature Penzance is superior to many foreign winter health resorts.

Falmouth is pleasantly placed in the midst of a beautiful country, has a fine harbour, and is by many preferred to Penzance as being more lively. It is about thirty miles to the east of Penzance, and, as before stated, has a very similar climate. This group of health resorts is most suitable for those

* The table for the Scilly Islands was compiled from observations supplied to me by the Meteorological Office, and for Penzance by Mr. Richards. Those for Falmouth are taken from Mr. Dymond's pamphlet.

who are suffering from chronic bronchitis, or who, from their ailments, require a mild sedative climate. This remark applies also to the Scilly Islands.

The *Scilly Islands* are rather numerous, and of these five are inhabited, viz., St. Mary's, Tresco, St. Martin's, Agnes, and Bryer. The population is about 2,000, of which about two-thirds reside in St. Mary's, which is about nine miles in circumference, and is described as being exceedingly beautiful and varied, although containing but few trees except in one spot. There are some comfortable hotels, but there is little amusement besides that obtainable by boating, fishing, walking, and driving. Tresco, which is readily accessible from St. Mary's, was chosen by the lord proprietor of the isles for the site of his house and gardens, and is more beautiful than St. Mary's. The gardens contain large numbers of tropical plants which grow in the open air, such as dragon trees and aloes in abundance, as well as prickly pears and other West Indian plants. Rare shells are also frequently met with, especially at Tresco. Brocoli and potatoes are largely grown here, for the spring markets in London.

Guernsey and Jersey.—The observations made by Dr. Hoskins at Guernsey have been taken as representing the meteorological peculiarities of the Channel Islands, because they have been continued for some years and are trustworthy, and no corresponding observations are obtainable for Jersey. A comparison with the tables for London and Penzance shows a marked similarity with the latter, as the mean temperature for the five months at Penzance was 45.8°, and at Guernsey, 45.0°, or only 0.8° lower. The mean of all the lowest temperatures is, however, 1.2° below that of Penzance, so that the mean daily range is 7.9° against 6.0°, and the mean monthly range is 24.6° against 21.2°. The amount of rainfall is, however, less, as an average of 20.40 inches were recorded against 23.54 inches at Penzance, and 92 rainy days against 106 at St. Mary's, which is probably rather below the number for Penzance. As compared with London the difference is very marked in every month excepting March; for in November the mean temperature was 5.4° in excess, in December 4.8°, in January 3.8°, in February 3.6°, and in March only 1.0°. The mean of all the lowest temperatures was also much higher than in London, having been 6.5° in excess in November, 5.6° in December, 5.5° in January, 5.3° in February, and 4.1° in March. The number of rainy days was greater in January by 10, and the total rainfall double. The great objection to the Channel Islands is the stormy state of the weather in the winter months, and the length of the sea passage; but the climate is so equable that to those who do not object to this, these islands will afford a suitable winter residence until the middle or end of February, when easterly winds are prevalent. As regards St. Heliers frequent fogs occur, so that St. Aubins and localities to the south-west are much preferable. Sir James Clarke noticed the close resemblance between the climate of these islands and Penzance, remarking that both are subject to cold east winds in spring and high winds in winter, with the same equable temperature and humid atmosphere which render both so suitable for the residence of certain invalids. It will be observed that Dr. Clarke fell into the error so commonly entertained of considering the atmosphere of a place to be necessarily humid if the rainfall be large, whereas in reality the air of Guernsey in winter is drier by 1° than that of London, the former having been 87 and the latter 88 (saturation, 100) during the winter months of the four years under discussion. The mean humidity of Guernsey was 2 as compared with London in November; 3 in December, the same in January, 1 in February, and 3° higher in March. The mean annual temperature of St. Heliers is stated by Dr. Hooper to be 50.06° and the winter temperature 43.82°, which is more than 1° below that of Guernsey as given above. The mean number of rainy days at Guernsey for the four years was 93 out of 151 days in the five months, the largest number, 20, having occurred in December and January. Jersey is situated about 13 miles from the north-west coast of France, is about 12 miles in length and 5 in breadth, and Guernsey, which is nearer the English coast, is considerably smaller. The coast is rocky and precipitous, but is indented by St. Aubins' and St. Clement's bays. St. Heliers is situated at the eastern extremity of St. Aubins' Bay, and possesses good accommodation for invalids. The cases likely to receive benefit from a residence in these islands are the same as those which are recommended to winter at St. Mary's, Penzance, or Falmouth, such as chronic bronchitis and perhaps asthma. Patients, however, who are of a leuco-phlegmatic temperament, or of a debilitated constitution, are scarcely likely to benefit by a residence at either place. Dr. Scholefield, who has written on the diseases of Jersey, says that rheumatism, dyspepsia, and liver derangements are amongst the common diseases of the island, and it is therefore evident that persons so afflicted should not go there. Dr. Scholefield also states that cutaneous diseases as well as maladies incidental to women are frequently met with, and owing to the relaxing climate

PENZANCE.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature.. ..	47.6	45.3	45.9	45.0	45.3	45.8
,, of all the highest ..	50.6	47.6	48.6	47.6	48.5	48.6
,, of all the lowest ..	44.4	42.2	43.2	42.3	40.9	42.6
,, daily range	6.2	5.4	5.4	5.3	7.6	6.0
Monthly range	23.2	21.7	18.1	21.0	22.4	21.3
WINDS.						Total.
No. of days N. and E. ..	14	12	6	11	14	57
,, ,, S. and W. ..	16	19	25	17	17	94
RAIN.	in.	in.	in.	in.	in.	in.
Total fall	5.04	6.14	5.97	3.53	2.84	23.52

FALMOUTH.—1870-74.

Mean temperature.. ..	47.5	43.6	44.0	44.2	45.5	45.0
Extreme range	20 6	19.5	17.9	17.1	24.1	19.8

CAMDEN TOWN, LONDON.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature.. ..	43.4	39.6	41.5	39.8	42.3	41.3
,, of all the highest ..	48.8	43.8	46.6	45.4	49.8	46.9
,, of all the lowest ..	37.9	34.9	36.0	34.9	35.6	35.9
,, daily range	10.9	8.9	10.6	10.5	14.2	11.0
Extreme range	32.1	32.2	31.1	31.7	37.2	32.9
Mean humidity	88	89	90	89	83	88
WINDS.						Total.
No. of days N. and E. ..	16	11	8	12	11	58
,, ,, S. and W. ..	14	20	23	16	20	93
RAIN.						
No. of days..	16	15	19	17	16	83
	in.	in.	in.	in.	in.	in.
Total fall	2.63	2.31	2.11	1.43	1.60	10.08

ST. MARY'S, SCILLY ISLANDS.
Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature	50.1	47.1	47.8	46.9	47.5	47.9
,, of all the highest ..	52.2	50.1	50.9	49.6	49.7	50.5
,, of all the lowest ..	47.3	44.0	44.6	44.2	42.6	44.5
,, daily range	4.9	6.1	6.3	5.4	7.1	6.0
Monthly range	18.5	18.5	18.2	18.0	20.5	18.7
Mean humidity	88	89	94	90	86	89
WINDS.						Total.
No. of days N. and E. ..	14	11	7	10	14	56
,, ,, S. and W. ..	15	19	23	18	15	90
RAIN.						
No. of days..	21	23	22	22	19	107
	in.	in.	in.	in.	in.	in.
Total fall	4.12	4.98	3.92	2.13	1.98	17.13

GUERNSEY.
Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature.. ..	48 4	44.4	45.3	43.4	43.3	45.0
,, of all the highest ..	51.9	48.1	49.4	47.7	48.8	49.2
,, of all the lowest ..	44.4	40.5	41.5	40.2	39.7	41.3
,, daily range	7.5	7.6	7.9	7.5	9.1	7.9
Monthly range	23.7	24.2	22.2	22.1	25.8	23.6
Mean humidity	86	86	90	88	86	87
RAIN.						Total.
No. of days	19	20	20	18	16	93
	in.	in.	in.	in.	in.	in.
Total fall	5.52	5.84	3.96	2.74	2.34	20.40

are difficult of cure. Consumption, however, is said to be rare in these islands, which as they are 'blowy' places is very probable.

The table was compiled from the observations made at Guernsey by Dr. Hoskins at an elevation of 204 feet above the sea.

THE EUCALYPTUS AND THE PINE,

CONSIDERED IN RELATION TO THEIR SANITARY PROPERTIES.*

BY C. T. KINGZETT, F.C.S., F.I.C.

IS is widely known, that the Eucalyptus and the Pine have long enjoyed a popular reputation as health agents. In particular, the Eucalyptus has acquired the character of an antimalarial tree; and, under the title of the 'Fever-destroying tree,' has been largely cultivated in various parts of the world, with the view of rendering habitable large districts previously devastated and depopulated by malaria, etc. In reference to the old theory of the action of the Eucalyptus, which attributes its sanitary properties to its drainage powers, this hypothesis always lacked evidence, and at its best was of a negative character. In the first place, the Eucalyptus is only superior to other trees as a means of drainage in the proportion in which its rate of growth exceeds that of other trees; and this is not sufficiently notable to account for its marvellous fever-destroying properties. Again, other trees, even if planted in malarial districts, do not free them from the disease, so that the action of the Eucalyptus is of a positive type, and, like the Pine tree, its properties are of a healthful nature, upon whatever soil or in whatever climate it may grow, whether in deep valleys or upon the sides of mountains. Others have maintained that just as Pine forests were supposed to exert their beneficial influence upon persons suffering from pulmonary and other affections, by virtue of the volatile emanations proceeding from them, so the Eucalyptus produced its well-known effects by the oil which is evaporated from its leaves. The genus Eucalyptus embraces over 130 species, and of these, Eucalyptus Amygdalina is the most abundant oil-giving tree, one hundred pounds of the leaves giving from three to six pounds of the oil. This oil is practically identical in composition with the oil of turpentine derived from Pine trees, and with most of the so-called essential oils or perfumes. During an investigation extending over many years, I have ascertained that all these oils, when subjected to the action of atmospheric oxygen and moisture, produce peroxide of hydrogen (a substance resembling ozone in its oxidising properties), and a number of camphoraceous substances having marked antiseptic powers. Knowing; then, how much of these substances are yielded in the laboratary by a given quantity of oil of eucalyptus or oil of turpentine, I have extended my calculations to the Pine and Eucalyptus forests which are so abundantly distributed in Nature. Taking New South Wales and South Australia alone, I calculate that the Eucalyptus forests of this district contain at any given moment sufficient oil in the leaves (ready to be evaporated into the atmosphere under the agency of warm winds) to form by contact with the atmosphere no less than 92,785,023 tons of pure peroxide of hydrogen and 507,587,945 tons of camphoraceous principles. Now, if it be remembered that in Nature all matters of animal and vegetable origin are oxidised by the atmosphere, which is thus kept free from the pernicious products of putrefaction, and that peroxide of hydrogen is a much more powerful oxidant than ordinary oxygen, and if it be also borne in mind that the camphoraceous products above referred to are also powerfully antiseptic, then the health powers of the Eucalyptus can neither be wondered at nor be longer open to any doubt. What is true of the Eucalyptus is true also of the Pine, and on an immensely larger scale; for Pine forests are freely distributed over both hemispheres, and the oil of turpentine, which is a natural product of these trees, undergoes the same chemical changes in the atmosphere as oil of eucalyptus. By imitating this natural process of oil oxidation, I have succeeded in obtaining and rendering available in commerce the antiseptic and oxidising principles to which Pine and Eucalyptus forests owe their hygienic influences. The manufacture is being largely conducted. I have named it 'Sanitas', for want of a more expressive title.

* Abstract of a paper read before the Health Section of the Social Science Congress at Manchester, October, 1879.

The Sanitary Committee of Paddington have recommended that the examining officer be instructed to take immediate proceedings, under the Canal Boats Act, against the owner of any unregistered boat. The Paddington authorities appear to have shown more activity in this matter than any other Metropolitan authorities, since of 80 boats which have been registered in London, 79 were registered in that parish.

The specific heat of water has recently been redetermined by Herr Heinrichsen, who finds it to be midway between Regnault's and Jamin's determinations, viz., 1.013 and 1.122 (for 100 deg.), his figures being 1.071.

THE

SANITARY RECORD.

DECEMBER 15, 1879.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE SANITARY LEGISLATION OF 1879.

WHILST the larger measures of sanitary importance introduced into the Houses during the last session of Parliament had all to be thrown overboard for want of sufficient time to discuss them in, several minor measures affecting more or less the action of local authorities were passed into law. Thus, while the Noxious Gases Bill, the Rivers Conservancy Bill, the County Boards Bill, and the Valuation Bill all became, sooner or later, 'dropped orders', the passing of the Poor-Law Amendment Act, the Sale of Food and Drugs Act, the Public Works Loans Act, the two Artizans' and Labourers' Dwellings Acts, and the Public Health (Interments) Act, show that Parliament is at least alive to the enormous and growing importance of the preservation of the public health.

There were two Poor-Law Amendment Acts passed last session, but only one has any bearing on sanitary matters. This Act (42 and 43 Vict., c. 54) provides by its 14th section for the transfer of hospitals and other buildings from the Poor-Law Guardians to the Rural Sanitary Authority, with a view to their being used for the isolation of non-paupers suffering from infectious disease. In many rural districts in the kingdom the only means of isolation available for the whole population are at the workhouse, and the accommodation provided is often in excess of the requirements of the inmates. In innumerable instances, when cases of infectious disease have occurred in homes to which section 124 of the Public Health Act would apply, it has been felt unreasonable to ask justices to give an order for the removal of the sick person because of the stigma which is popularly associated with treatment in a workhouse. The section in question, therefore, properly provides that the guardians may by resolution transfer any hospital buildings vested in them to the Rural Sanitary Authority, such transfer to be subject to the confirmation of the Local Government Board, who may be presumed to require all due dissociation of the hospital from the workhouse. Transfers of this sort have taken place in several parts of the country before the passing of the recent Act, but they will now be put on a more legal footing. One such transfer is recorded by Dr. Barry, in his report for 1878, as taking place at Settle last year. The hospital was visited and reported on by Dr. Thorne Thorne, and the approval of the Local Government Board was made dependent on certain alterations (such as the construction of a separate road, etc.) being made.

There is clear evidence in this section that the Local Government Board are anxious to secure that these transferred hospitals shall be free from any suspicion of workhouse taint, so that the independent poor—who have a horror of 'the house' which it is on every ground important to uphold—shall be encouraged to make use of them. The section (No. 15) which follows it is, therefore, the more surprising, as completely subverting the policy indicated in section 14. It provides that the Metropolitan Asylums Managers may, from time to time, with the approval of the Local Government Board, contract with any metropolitan Sanitary Authority for the reception and maintenance, in the hospitals belonging to the managers, of any person suffering from infectious disease. Such person is apparently not to lose caste by going to the managers' hospitals, as he is to be deemed to be maintained by the local Authority with whom the contract is made, and the expenses incurred by the local Authority are to be recoverable from him. As a corollary to this section, the Asylums Managers are empowered (section 16) to provide and maintain ambulances with the necessary staff and appliances. All expenses incurred by the Managers in the execution of this section will be paid out of the Metropolitan Common Poor Fund.

When section 15 was yet in the clouds, we protested against its enactment as emphatically not the right way to provide for the non-pauper hospital wants of London (vol. x, p. 231). We have already given at length (*Ib.*, p. 147) our views on the subject of the proper isolation provision for the metropolis, and we may add that the opinion there expressed, that the Metropolitan Asylums Board should be transformed from a poor-law to a sanitary body, and be elected by sanitary authorities as well as by boards of guardians, has received the cordial assent of all those who are able to look upon the matter from a higher point of view than that of the official or the vestryman. Already difficulties are arising from the operation of this section. The difference between a non-pauper and a pauper, where they are maintained in the same hospital, will be a fertile source of unpleasantness, for it must be remembered that, whilst a non-pauper case has to be paid for by the district, the expense of a pauper case is distributed over the whole metropolis. Thus, Sanitary Authorities, especially those of the poorer neighbourhoods, where most cases requiring isolation will arise, and where, consequently, the sum to be paid to the Asylums Managers will be very large, will be likely to be most unwilling to assume the responsibility for persons on the borders between independence and pauperism, and between two stools the unhappy wretch will come not to be isolated at all. In this connection it deserves to be borne in mind that the section is permissive only; and, for the reasons just explained, we confess we cannot share the opinion

of the Local Government Board, as expressed in a letter addressed to the asylums managers upon this subject, 'that they have no doubt that most, if not all, of the Metropolitan Sanitary Authorities will readily enter into agreements which will have the effect of relieving them from the heavy responsibility under which they now lie in respect of infectious hospital accommodation for the non-pauper classes. Another aspect of the question which has not been adequately considered by the Sanitary Authorities who so gaily signed the memorial to Mr. Cross (vol. x, p. 146) is this:—They strenuously resisted the attempt made by Mr. Sclater Booth in his Public Health (Metropolis) Bill of 1877, to secure for the Local Government Board supervision over them and their doings. But now they have, at their own request, allowed the Local Government Board (who have the absolute control of the Metropolitan Poor Fund, which supports the Asylums Board) to exercise supervision over their arrangements for isolation of infectious cases—*i. e.*, over one of their most important sanitary duties. Whether this arrangement will ever work smoothly is more than we can tell, but we cannot but think that it is a most ill-advised piece of legislation.

The next Act to which we have to refer is the Sale of Food and Drugs Act. This settles the historic 'prejudice to purchaser' question, by enacting in its second section that in any prosecution under the provisions of the principal Act it shall be no defence to any such prosecution that the purchaser, having bought only for analysis, was not prejudiced by such sale. It gives, moreover, facilities for taking samples of milk in transit for the purposes of analysis, and provides that any street or open place of public resort shall be held to come within the meaning of section 17 of the principal Act. The standard below which spirits will be held to be adulterated is settled by section 6, as 25 degrees under proof for brandy, whisky, or rum, and 35 degrees under proof for gin. A limit is also placed by section 10 on the time within which proceedings can be taken against the vendor of adulterated articles. This Act seems to us to be useful, and we have nothing to say upon it.

The Public Works Loans Act, which at one time threatened to restrict very largely the borrowing powers of local Authorities, has now been modified so as to provide only that the amount to be advanced by the Public Works Loan Commissioners to any one Authority under one Act in any one financial year shall not exceed £100,000, and that the Commissioners may charge on their loans such interest as the Treasury may deem necessary to save the Exchequer from loss.

It is difficult to give any condensed explanation of the purpose of Mr. Torrens' Artizans' and Labourers' Dwellings Act (cap. 63), but it may be stated generally that it is intended to make the Act of 1868 more workable than it has been. We trust that it will fulfil the hopes of its promoters; but we are not sanguine on the subject. The most important provision is section 5, which provides that the owner of any premises specified in an order of the local Authority under the Act of 1868 may require the Authority to purchase the premises which he is ordered to improve or to demolish. The Government Act (cap. 64), relating to the same subject, amends Mr. Cross's Act of 1875 in two respects, both apparently intended to diminish the expenses of improvement schemes. Section 3 provides that when it is proved to the satisfaction of the arbitrator that at the date of the Act authorising the scheme any premises were in such a condition as to be a nuisance, he may deduct from the amount of compensation to be paid to the owner the estimated expense of abating the nuisance. This seems to us to be a somewhat puerile provision. When any such case arises, the owner is sure to maintain that his premises were not a nuisance; and if the Authority persist in saying that they are, they will have to explain why they have allowed the powers which they possess for repressing nuisances to remain inoperative. Awkward questions are sure to arise when any such claim is made; and, as in no case could the amount to be deducted be very large, we do not anticipate that this section will be much made use of. The great obstacle to the carrying out of improvement schemes is their enormous cost; and if the price is to be appreciably reduced, some more sweeping measure than this section will be necessary. Against the other provision (section 4) we have nothing to urge. It enacts that when it is proved to the satisfaction of the confirming Authority that equally convenient accommodation can be provided for people displaced by an improvement scheme at some place other than within the area or the immediate vicinity of the area comprised in the improvement scheme, it shall be lawful for the confirming Authority to authorise such modifications.

The only remaining Act with which we have to deal is Mr. Marten's Interments Act, which was certainly hurried through the Houses with unnecessary haste. The objections which have been urged against it are of a purely religious kind, and we shall not therefore enter into them. The Act itself consists of three clauses and twenty-five lines only; but it is one of considerable importance. Its object is to enable Sanitary Authorities, rural as well as urban, to provide cemeteries for their districts, and for this purpose all the provisions of the Public Health Act, 1875, with respect to a mortuary, are extended to a cemetery. Just as section 141 of the Public Health Act enables an Authority to provide and fit up a mortuary, and to make bye-laws for its management and charges for the use of it, so Mr. Marten's Act empowers a Sanitary Authority to provide a cemetery, and renders it compulsory on them to do so if the Local Government Board should require one to be provided. In the words of the Act, the Authority may 'acquire, construct, and maintain' a cemetery, and they are therefore empowered not only to establish a cemetery, but also to purchase an existing one.

Moreover, with the sanction of the central Authority, they will be enabled to borrow money to pay for the purchase of the requisite land, for draining and enclosing the site, and for rendering it otherwise suitable for the object intended. With regard to the regulation of the cemetery after it has been established, the application to a cemetery of section 141 of the Public Health Act, 1875, will enable the Sanitary Authority to make bye-laws with respect to the management and charges for the use of any cemetery established by them, and in this manner to provide for the orderly conduct of all persons within its limits, for the regulation of graves, and for the payment of reasonable fees for interments therein.

In order to make further provision for the maintenance and management of the cemetery, the Act incorporates the Cemetery Clauses Act, 1847 (10 and 11 Vict., c. 65), the provisions of which will now form part of the Public Health Act, 1875. The greater part of the clauses of the incorporated Act deal with religious questions, and the only section of importance for the purposes of the present article is that which provides that no cemetery shall be built nearer to any dwelling-house than 200 yards except with the consent of the owner or occupier. The Act, it will be observed, gives for the first time to the Local Government Board jurisdiction in the matter of burial grounds. The Home Secretary apparently still retains the power of closing churchyards if he sees fit; and here again we foresee the administrative muddles that will never be ended till we have a proper Ministry of Health. If such an Act as Mr. Marten's were required, it should have been done by the amendment of the Burial Acts rather than the Public Health Act. But the Government have apparently been afraid to risk again the chance of a defeat in an attempt to consolidate the Burial Laws (which, as Lord Cranbrook naively observed, no Home Secretary has yet been able to understand), and have been content to assist in 'rushing' through the Houses a Burials Bill under the guise of an amendment of the Public Health Act. We sincerely hope that the Act will be of value, and that it will be largely put in force by local Authorities. To this we would add a hope that the Local Government Board will be careful not to stir up any religious strife in deciding upon the cases submitted to them.

REGISTRARS' RETURNS TO SANITARY AUTHORITIES.

SANITARY Authorities and their Medical Officers of Health are dependent upon periodical returns, furnished by the local registrars, for information as to the mortality statistics of their several districts. In the course of our endeavours to secure the co-operation of medical officers of health, to enable us to publish uniform monthly mortality statistics of urban sanitary districts, it has become apparent that considerable doubt exists in some quarters as to the exact relations between sanitary authorities and local registrars, with respect to these mortality returns. We propose, therefore, briefly to describe the regulations which govern the duties of registrars in furnishing these returns. The difficulties experienced by Medical Officers of Health with regard to these mortality returns are of two classes; the first relates to the form of the return, or the rate of payment; the second, to the difficulty of obtaining the returns with prompt regularity.

Previous to the Births and Deaths Registration Act of 1874, the payment for these mortality returns was a matter left entirely to private arrangement between sanitary authorities and registrars; and, beyond this, there was considerable doubt whether payment for these returns would be recognised as a legal payment by the auditors. In order to meet these two difficulties, the following section (28) was added to the above mentioned Act of Parliament. It is there provided that:—'Every registrar when, and as, required by a sanitary Authority, as defined by the Public Health Act, 1872, shall transmit by post or otherwise a return, certified under the hand of such registrar to be a true return of such particulars, registered by him concerning any death, as may be specified in the requisition of the sanitary Authority. The sanitary Authority may supply a form of the prescribed character, for the purpose of the return; and in that case the return shall be made in the form so supplied. The registrar making such return shall be entitled to a fee of twopence, and to a further fee of twopence for every death entered in such return, which fee shall be paid by the Authority requiring the return.'

The wording of this section clearly implies that any sanitary Authority, as defined by the Public Health Act, 1872, can require a return of any or all the registered particulars 'concerning any death registered by the local registrar'. The sanitary Authority may supply a form for the return, on which the return must then be made. Nothing is said as to any necessity for obtaining the sanction of the Registrar-General to the form used for this purpose; and it is evident that neither the Registrar-General, nor the local registrar, has any power to withhold from these returns any particulars registered concerning the death, if copies thereof are duly required by the sanitary Authority. We have heard of cases in which registrars have objected to furnish copies of certain particulars in the Death Register. Such objection or refusal is clearly illegal; and, in face of this Section 28, could not be maintained, if such objection were reported to the Registrar-General. It is most desirable that Medical Officers of Health should receive full copies of the first six columns of the Death Register; such particulars as the rank or occupation of the deceased, and the name of the certifying medical practitioner should invariably be furnished to Medical Officers of Health. Many of the forms for these returns, furnished to registrars by Medical Officers of Health are not, however, well suited for the purpose; they frequently are so badly spaced and arranged as to materially increase the labour of the registrar in copying; and in many instances they fail to provide for all the particulars which should be furnished to Medical Officers of Health. While it is important that the Medical Officer of Health should be fully informed of all the particulars of deaths registered, it is also desirable that the form should provide for the particulars being copied, in the order in which they appear in the schedule of the register, so as not, unduly, to add to the necessary labour of furnishing these returns. Many abbreviations might also be safely sanctioned

in copying the registered particulars, except those in the cause of death column, which should be copied verbally and literally. These abbreviations would not, in the slightest degree, detract from the value of the returns for the purpose of the Medical Officer of Health. As the above mentioned section of the Births and Deaths Registration Act only provides that the sanitary Authority *may* supply the necessary forms for these returns, suitable forms for the purpose have been prepared by the Registrar-General, and are issued to registrars, on application, from the Central Office.

Unfortunately, when the above-mentioned section of the Births and Deaths Registration Act was framed, no provision was made for furnishing to Sanitary Authorities returns of the number of births registered within their districts. It is scarcely necessary to say that this information is essential to Medical Officers of Health, in order to enable them to prepare their periodical returns of vital statistics. No vital statistics would be complete which omitted to take account of the birth-rate. Without a return of births, it would be impossible to apply one of the best standards for measuring infant mortality. As this necessity is not provided for by the Act of Parment, the supply of the number of births registered becomes a matter of arrangement between Sanitary Authorities and Registrars, which is not satisfactory in all cases. It may, however, be useful to Sanitary Authorities and to Medical Officers to know that the Registrar-General has ruled that in all cases where returns of deaths are required and paid for by Sanitary Authorities, Registrars should also supply the numbers of births registered during the period embraced by the return. In any cases, therefore, where difficulty is experienced in obtaining the numbers of births from Registrars, we would suggest that the circumstance should be reported to the Registrar-General. This course would probably prevent any future difficulty.

Lastly, a word or two as to want of punctuality on the part of Registrars in furnishing their weekly or monthly mortality returns to Sanitary Authorities. Nearly 300 Registrars furnish weekly returns to the Registrar-General; and each of more than 2,000 Registrars supply quarterly returns. The punctuality with which the Registrar-General's Weekly and Quarterly Returns are issued precludes the possibility of much irregularity in the receipt of these local returns. We have, moreover, good reason for knowing that the Registrar-General would not lightly tolerate carelessness or irregularity on the part of Registrars in furnishing their mortality returns for the use of Medical Officers of Health. We are confident that any reasonable complaints from Medical Officers of Health to the Registrar-General as to difficulty of obtaining those mortality returns would receive prompt attention, and would yield satisfactory results. Weekly mortality returns should be in the hands of Medical Officers of Health on each Monday morning; and monthly returns on the 2nd of the month succeeding that to which they relate. We see no reason why any greater delay than this should occur in the receipt by Medical Officers of Health of Registrars' periodical mortality returns.

'The Fern Paradise', Mr. Francis George Heath's illustrated 'plea for the culture of ferns', after passing through five editions, is about to be re-issued by Messrs. Sampson Low, Marston, and Co., in shilling numbers, as a monthly serial. The first number will be published in a few days.

NOTES OF THE MONTH.

THE MALTON URBAN SANITARY AUTHORITY.

The Malton Urban Sanitary Authority have adopted the recommendation of Mr. Hawkin Webster, the borough surveyor, with respect to a new scavenging system, and in future all new buildings will be adapted to either the Manchester or Rochdale systems; Manchester for better class houses, and Rochdale for cottages; they have also divided the borough into districts, for night and day scavenging. The surveyor called the attention of the Board to several breaches of the Bye-laws in two cases: drains had been covered up, without due notice being given for inspection; in one case the main drain had been tapped, instead of a proper junction being inserted, and the Board decided to make the parties alter the same, and legal proceedings to be taken against parties transgressing in future. The sanitary state of the borough is a decided improvement upon last year, owing to the new sanitary arrangements, which have been efficiently carried out. The Sanitary Authority have also decided to erect stables and other buildings from plans prepared by their surveyor. The stables are to be ventilated by Musgrave's stable ventilator, and Ellison's conical ventilator.

SCARLATINA IN SUSSEX.

There has been an extensive and fatal outbreak of scarlatina in the parish of Fletching, population 2,300, in the Uckfield Union. In less than a month there were about 36 cases and 7 deaths from the disorder, a mortality (in the 30 days) of about 35 per 1,000 living persons annually. All the children infected, or their brothers and sisters, attended the public school, which was closed at the urgent request of the Medical Officer of Health for East Sussex. It is somewhat doubtful how the disease originated. The two first cases were not well pronounced, so that the complaint obtained a footing before vigorous measures for arresting it were adopted, which, being taken, the epidemic was soon arrested. There are, we are informed, no very serious sanitary defects in the village.

URBAN WATER SUPPLY.

It will be remembered that in the Session of 1878 the Marquis of Stafford moved for a return as to the means by which drinking-water is supplied to all the urban sanitary districts of England and Wales. This return (see vol. viii, p. 392) has just been issued as a Parliamentary Paper, of 150 folio pages. The nature of its contents obviously forbids any attempt to summarise the Blue-book, which, as a work of reference, will be of extreme value, as bringing together the actual facts as to the way in which all the more considerable aggregation of houses in the Kingdom are supplied with water. It seems a pity that nothing more than the bald returns have been vouchsafed in the return. A few remarks by the compiler, as to its general outcome, would have rendered much more intelligible the present bewildering details as to each of the 944 districts dealt with in the return.

SHEEP-ROT AT BRISTOL.

A report of an inspection of the wholesale meat and fish markets, and of many slaughter-houses and

butcher's shops, made by the Medical Officer of Health for Bristol, and which was recently submitted to his authority, merits a little attention. First, it is hopeful to find that after a two days' carefully conducted inspection, nothing was found unfit for food of man. Secondly, it is gratifying to have so competent a medical officer as Mr. Davies laying down the rule as regards 'rot', in accordance with modern views on the subject. Mr. Davies plainly tells his Authority, that as the result of his inspection, he found a considerable number of carcases of sheep and lambs affected with liver fluke, which is now, unfortunately, prevalent in parts of Gloucestershire, Somerset, and Devon; but, 'the fact of an animal having been affected with this parasite is not *ipso facto* a reason for condemning the carcase as unfit for food'. Mr. Davies goes on to say that the first effect of the presence of the entozoon is to increase the production of fat; the second to cause atrophy of the muscles, and the third to cause atrophy of all the tissues, including the fat; and that, except the sheep has reached an advanced stage of the disease, it might be safely and profitably used for food. The medical officer says nothing about general anasarca, which, after all, is the main symptom when animals are at all badly afflicted with fluke; and we can only conclude, that in none of the carcases examined was this condition noticeable. Mr. Davies is, as he himself claims, simply following the practice of the best authorities in this matter; but he has spoken out very fearlessly, and his report will doubtless be of service to his younger brethren in the profession.

DISINFECTION BY ACIDS.

At a recent meeting of the Glasgow Philosophical Society, Dr. Fergus in the chair, Dr. John Dougall read a paper on 'Disinfection by Acids'. Of late years, he said, perhaps no material had been so largely used in disinfection as carbolic acid. Experiments had led him to the conclusion that carbolic acid was not a disinfectant, not a destroyer of organic matter, but rather an antiseptic—a preserver of organic matter. Acids were prompt and efficient zymotics. Disinfection by acids was far from new. They were used by Greeks to fumigate their temples after sacrificial rites, and also to destroy the parasites which infested their sheep. Acetic acid had been long used as a disinfectant. Its reputation as such was said to have arisen from the confession of four thieves who, during the plague of Paris, plundered the dead bodies with perfect security, and who, on being arrested, stated, on condition of their lives being spared, that the use of aromatic vinegar had preserved them from the influence of contagion. His experience and observation had convinced him that disinfection by acids was cheap, quick, easy, and certain, and he had been frequently struck with the summary manner in which an infectious disease had been thus averted under circumstances most favourable to its propagation. For disinfection he advised the use of three acids—hydrochloric, sulphurous, and aromatic glacial acetic acid.

ERYSIPELAS AND SEWER-GAS.

The *Chicago Daily News* states, that in a house fitted 'with all modern improvements', in that city a physician was recently called in to attend a lad suffering with facial erysipelas. He found the boy's elder brother just recovering from a large carbuncle, and the mother, convalescing from erysipelas, had a patch of gangrene on the forehead as large as a quarter dollar. Although no unpleasant odour was perceptible, and the plumbing seemed all right externally, careful examination revealed the soil-pipe to be disconnected from the sewer connection beneath the basement floor, and the ground was literally soaked for yards in extent with the contents of the soil-pipe.

FIREGUARDS.

Attention has been called by the Coroner of Birmingham to the number of children burnt to death at this season of the year, through the want of a fireguard. He held inquests, in one day, recently, upon the bodies of no fewer than seven children who had been accidentally burnt at their respective homes during a few days. The ages of the children ranged from 16 months to 10 years, and in nearly every instance death had resulted from incautious approach to an unguarded fire. The coroner said if the committee of management of the hospital where the inquests were held could be induced to consent to some appeal being distributed in a cheap way to every one in the borough, they might do a great deal of good; failing that, the committee might set a little machinery at work, and go to the Home Secretary and ask him in the Bill, which was certain to be introduced by the Attorney-General next Session—the Bill for the Codification of the Criminal Law—to provide that if a child was burnt owing to the want of a fireguard, and if its father was able to afford it, but had not done so, and wilfully exposed his child to a horrible death, the neglect should be made a penal offence. He would not say what form the punishment should take. If they fined a man they punished his wife and children, and if they sent him to prison they prevented him earning his bread. It seemed to him that a little physical suffering, in the shape of the cat-o'-nine tails, would have an enormous effect in inducing a change. The machinery for obtaining proof as to the capability of the father to afford the purchase of a fireguard might, we fear, prove cumbrous and expensive; but it is certainly desirable that something should, if possible, be done to check so dreadful and wanton a waste of human life.

A PENNY DINNER.

Mr. Ernest Hart writes;—'Many will, we think, be interested to read the following *menu* of a dinner party recently given with the view of demonstrating the practical character of the opinions expressed by the "Doctor in the Kitchen" as to the possibility of combining economy in material with a certain degree of gastronomic refinement and fully adequate nutrition. The party numbered ten, and included some ladies and gentlemen prominent in professional and literary circles. It was understood that the dinner should consist of eight courses, and that the total expenditure for material for each individual should not exceed a penny for each course. The *menu* consisted of potage croûte au pot, harengs frais grillés, sauce moutarde; œufs au kari, homard en escallopes, bœuf à la maitre d'hôtel, haricots blancs sautés, navets glacés au jus, mince pies, glaces à la vanille. The following was the cost of materials: — Ox cheek, 1s. 2d.; vegetables, 3½d.; cabbage, 1d.; parsley, etc., 4½d.; 10 fresh herrings, 6d.; butter, etc., 2½d.; lobster, 6½d.; bread crumbs, butter, etc., 4½d; eggs, 6d.; rice, curry, etc., 4½d.; turnips, 6d.; butter and sugar, 3½d.; mincemeat, 6d.;

flour and butter, 4d. Cream ice—milk, 2½d; eggs, 4d.; ice and salt for freezing, 4½d.—11d. It will be seen that the cost did not exceed eighty pence for the ten guests, or eightpence each for the whole dinner of eight courses. The drinks consisted of lemonade made with fresh lemons for abstainers, but no attempt was made to put a limit on the cost of wines for those who chose to indulge in them. Dessert also was treated as purely a luxury, and the cost was not included. The dinner was declared by all the guests to be a thorough culinary and gastronomic success. There was not one dish which might not have been served by the most fastidious Amphytrion. It was, of course, on this occasion served with all the suitable refinements of a dinner party, and perhaps the general judgment is best summed up in the words of one lady, who said:—"Well, all I can say is, that it only differs from any other of the best dinner parties of the year, in that, on the whole everything was nice, and it is, perhaps, the best dinner I have had this year." This was, of course, rather an enthusiastic utterance. On the other hand, the judgment of cool critics may be taken as a voucher that this "penny dinner" was in every sense satisfactory; and that it at least demonstrated the possibility of utilising various simple materials, and of constructing a refined, agreeable, and nutritious repast, on a very economical basis. For this purpose good culinary skill, and some amount of thought are necessary, but it is intended to prove by a series of other dinners of the same kind, that the list from which such *menus* may be constructed is by no means a very limited one. The price chosen was arbitrary and extreme, with the simple view of pointing more clearly the moral which such a *menu* is calculated to convey as to prevalent "extravagance in eating". Of course, there is no reason why the cost should not be trebled or quadrupled, and yet a useful lesson be learned. It is only necessary to add, that everything was bought in the shops of the neighbourhood and in the ordinary market, and no attempt was made to secure extraordinary bargains for the occasion, although, of course, economy was rigidly consulted throughout. The soup especially, which was made from the strong meat stock obtained from the preliminary preparation of the ox cheek, was pronounced to be singularly good, and the haricots blancs, cooked in a Warrener pot and served with the beef, were *chef d'œuvre* of tenderness and excellent flavour. Vegetables are dear now, but the carrots glacés, as prepared with old carrots carefully steamed, glacés, and sautés, were pronounced delicious.'

THE ADULTERATION OF MILK.

Dr. C. Meymott Tidy, the Medical Officer of Health for Islington, in his annual report which he has just issued, states that during the year ending Lady-day, 1879, he examined 172 samples of food, and, except in the milk, he found no such evidence of adulteration as warranted him in advising a prosecution. In twelve of the milk cases he gave certificates of adulteration. They were all cases of added water, the adulteration varying on the lowest possible calculation from 10 to 30 per cent. Dr. Tidy adds:—'The milk-sellers have raised the price of their milk, but I can scarcely say that the quality has been improved, the price being, in fact, no guarantee of genuineness. The extent to which milk is adulterated is serious. For we must remember that to many (and those for the most part the very old and the very young) milk constitutes the sole article of diet. The doctor can easily be thwarted in his treatment of a patient by the dairyman. The public are in this way cheated of their money; and, if that were all it would be bad enough, but they are cheated of their health too.'

WINTER DRESS FOR CHILDREN.

For some years past it has been the fashion to leave portions of children's limbs uncovered. Mothers give as an excuse for this sacrifice to appearances that it hardens the children against changes of temperature. Without denying this happy influence in some cases, it is certain that in many others it is most fatal, and compromises the health and life of the children. Common sense suffices to show how dangerous is this practice; for, as Mme. de Sévigné said in a letter to her daughter: 'If your son is strong, a rough education is very good; but, if he is delicate, I have heard that in wishing to make children robust, we kill them.' The recent researches of Onimus and Brown-Séquard on the diseases of nerve-centres arising from surface impressions, have given new force and a clearer explanation to facts which have long since been observed by physicians, and which amply confirm the saying of Mme. de Sévigné. Moreover, it is an error to believe that children are less susceptible to cold than adults; the contrary is the truth, and we very much doubt whether adults could thus go about with naked limbs, without experiencing serious consequences. We repeat, that the exposure of the lower extremities to all atmospheric influences is a means of catching cold, which frequently brings on rheumatismal congestions of the nerve-centres, and we are persuaded that even the affections *a frigore* of the respiratory organs are often due to this mode of dressing; for it is known that the exposure of the arms and shoulders, though perhaps less frequently than the wetting or chilling of the feet, gives rise to colds. 'Keep the feet warm' is a very old hygienic maxim, notwithstanding which children's necks are better covered than their legs and feet. The influence of cold upon the lower extremities certainly reacts upon the spinal circulation, and we know how frequently children are exposed to that almost incurable affection, atrophic paralysis. Every time (says Dr. Onimus) that we have been able to trace exactly the history of such cases, we have found a chill as the cause of this affection. The vessels of the spinal cord, and particularly those of the grey substance, which are the most numerous, are congested by reflex action, and thus bring on the various symptoms of paralysis.

DIPHTHERIA AT AMPTHILL.

The shroud of mystery which still obscures the origin and spread of diphtheria is as impenetrable as ever, and we fear the veil will never be lifted until a searching inquiry into the whole question of the incidence of the disease is undertaken by Government. A report by Dr. Robert Cory to the Local Government Board, which is now before us, is only another addition to the numerous negative enquiries into diphtheria which have been made by that department, anxious, as it undoubtedly is, to acquire some exact knowledge as to this fell disease. The epidemic which Dr. Cory was sent to investigate took place at two or three adjoining villages in the Ampthill rural district. The cottages in these places are small and badly ventilated; their water-supply,

derived from pools, is polluted by privy soakage; and the cesspit privy is a source of considerable nuisance. Yet there was a complete absence of diphtheria for more than six years, until the late epidemic commenced. Its origin and course are not traced, but there seems ground for thinking that it may have been started by infection from Bedford, where, last year, diphtheria was extraordinarily prevalent. Altogether, 27 persons were attacked, no less than 18 being children between the ages of 3 and 15. There could be no suspicion of infected milk, and inquiry as to the diseases of animals led to no result. School attendance had no influence on the spread of the disease, for though the majority of first attacks in the various households were in children attending school, yet these were at the period of life (as subsequent attacks in the same houses, showed) when susceptibility to diphtheria is greater than among adults. Dr. Cory shows, moreover, that children equally exposed to infection at school, but living in different spots, were very unequally affected by diphtheria. Under these circumstances, it is impossible to say what favoured the spread of the disease. It may be mentioned, however, that the sanitary administration of the village is apparently very lax, and perhaps in that fact lies a partial explanation of the virulence of the outbreak.

THE RELATION BETWEEN LEAD COLIC AND GOUT IN SAILORS.

Dr. Bertrand has published, in the *Archives de Médecine Navale* for May 1879, an interesting article on the relations between gout and lead colic. In 1854, Dr. Garrod was struck by the frequent appearance of gout in patients who had come under treatment for lead poisoning. M. Charcot, who thought formerly that this circumstance was peculiar only to London, and caused by the hygienic conditions of England and British life, now fully admits that the first effect of lead on the kidneys is to prevent the excretion of the uric acid which is contained in the blood. This, as is well known, is one of the principal causes of gout. Sailors are particularly exposed to the effects of lead poisoning, and gout is not at all an unusual occurrence among them, although they can certainly not be said to be overfed or to lead an idle and luxurious life. The author gives an account of four very interesting cases of lead colic in patients who were suffering from gout. There was no hereditary diathesis in any of the cases, and the patients had led a strictly sober life.

THE ABUSE OF TOBACCO AND ALCOHOLIC DRINKS.

The Directors of the French Association for Preventing the Abuse of Tobacco and Alcoholic Drinks have offered a prize of 200 francs and a gold medal for the best answer to the following questions:—1. Show the consequences of the abuse of tobacco and alcoholic drinks, both from economic and moral points of view. What effect have their use and the habits engendered by it on work, economy, the family, and society in general? Show what expenses they entail, both directly and indirectly, on the consumers, and in what relation they stand to crime, suicide, mental disease, etc., and consequently to the losses and expenses they entail on both the state and the individual. 2. Show, by the help of well known facts, pathological observations, and experiments, what organic lesions and functional troubles may result from the abuse of tobacco. 3. Show, in the same manner, in what way similar results may ensue from the abuse of alcoholic drinks. The answers must be addressed, before the 28th of Feb. 1880, to the offices of the 'Association Française contre l'abus du Tabac et des Boissons Alcoholiques, rue de Rennes 44, Hotel de la Société d'Encouragement'. They must be written in French, not signed, but bearing a motto, which must be repeated in a sealed envelope containing the name and address of the author. If no answer should reach the desired standard, the prize will be held over until next year. The prize will be given at the general annual meeting of the association, which will take place in the course of March 1880.

THE ARTISANS' AND LABOURERS' DWELLINGS IMPROVEMENT ACT, 1879.

At a recent meeting of the City Commissioners of Sewers a letter was read from Mr. Secretary Cross, in which he drew attention to the Artisans' and Labourers' Dwellings Improvements Act, 1879, and pointed out that it conferred important facilities for carrying out schemes under the principal Act of 1875. By the 3rd section the amount of compensation would be considerably diminished in cases where the house or premises proposed to be taken could be proved to the arbitrator to have been at any time between the date of the official representation and that of the confirming Act 'a nuisance' within the meaning of the Nuisances Acts. The 4th section enabled the confirming authority to relax the restriction imposed by which it was necessary that the accommodation for persons of the working classes should be provided within the area affected by the scheme or in its immediate vicinity, unless there were special reasons to the contrary. Mr. Cross trusted the Commissioners would take advantage of these facilities to promote schemes, and co-operate with him to put an end as early as possible to the continued existence of those 'rookeries' which had at present such a moral and social effect for evil as to be a disgrace to a highly civilised community.

SEWAGE DISPOSAL—USE OF WIND POWER.

Considerable progress has been made with sewage outlet at Halstead. The entire length of sewer—which will be under-drained throughout—is about a mile and a quarter, and the work is being done in so thoroughly efficient a manner as to secure the highest commendation. The sewage farm, which consists of fifteen acres near Langley Mill, is also in course of preparation under the superintendence of Messrs. Bailey Denton and Co. Upon the lower portion, about five acres, the sewage will be discharged by gravitation, and there will be considerable labour bestowed in arranging the ground in terraces. On the river front the land is protected from floods by an embankment. It is estimated that some 60,000 gallons of sewage will be dealt with daily on the farm in dry weather, but provision is made for 250,000 gallons as a maximum quantity for wet seasons. A portion of the sewage will flow, as already stated, upon five acres by gravitation; the remainder will be pumped to eight and a half acres of higher ground—the Local Government Board having, after some pressure, sanctioned the trial of wind as the motive power for that purpose.

POISONOUS COLOURS.

An inquest has recently been held upon a young woman who was employed in a factory where a large amount of dusting colour of various kinds was in constant use, to the deleterious effects of which her decease was in great measure attributed. The jury returned a verdict 'that the death was caused by diarrhœa and vomiting, but how caused there was not sufficient evidence to show'. A rider was added to the effect that prior to deceased's death certain of the colours used in the factory were of a highly dangerous nature, and the jury recommended that they should, when practicable, be mixed either with varnish or some other liquid that would render them practically innocuous.

REFORM IN FIRE-GRATES.

Mr. J. J. Mechi, of Tiptree Hall, Kelvedon, Essex, asks us to state—which for the benefit of our readers we do with pleasure—that he will, for the public good, send (on application accompanied by a postage stamp) instructions for the construction of the 'Parson's' or 'Front-fire-Grate'. The tested gain by the use of this grate is an increase of 15 degrees of temperature, with a saving of one-third in fuel. Mr. Mechi believes that there are several millions of grates in use constructed on the wrong principle, hurrying the heat up the chimney instead of into the room, and thus causing an in-draught of cold air—this being especially the case with strong drawing registers. No part of a grate should be of iron, except the thin front bars, for iron is a conductor away of heat, but fire bricks are not so.

'NO MILK TO SPARE.'

A new device has been invented by milk dealers for defeating the improved clauses of the recent Adulteration Act, arming the inspectors with power to take samples of milk as it is being delivered at the houses of customers. This clause was introduced because it has been often ascertained to be the custom of many milk dealers to keep a pail of good milk on the counter to supply any one who comes into the shop to ask for it, since the demand at the shop was usually small, and among these counter customers there might at any time be an inspector. On the other hand, they were generally safe in sending out milk and water or skimmed milk to their customers, because until now the inspectors had no sufficient power to take samples in course of delivery. Recently a milkman in Camberwell refused to allow an inspector to take a sample in the street on the ingenious plea that he had no milk to spare, as all he had was required for the customers. Of course, if the excuse of 'None to spare' be permitted, the new statute will be entirely defeated. The metropolitan magistrates are, however, singularly lenient in all such cases, and appear to regard the various excuses of adulterators with an eye of great favour and even of admiration for their ingenuity. Mr. Chance accordingly in this case has ruled in favour of the ingenious milkman, observing that it was certainly a most important question, and he did not see how, when a certain quantity was ordered, the man was bound to supply the inspector. A special case has, we believe, been granted for a superior court. Meantime, the public are at the mercy of the ingenious milk dealer, who can add with impunity as much water as he pleases to the milk which he sends out by the simple device of instructing his servants that they have 'No milk to spare'.

'CAWD.'

Many reports reach us of the rapid spread of so-called 'cawd' among sheep in the West of England. The most manifest symptom is a falling off in condition, while there is occasionally some lameness, and the wool may be easily pulled out. After the animal is killed the liver is always found to be more or less affected, being generally soft, pale, and spongy. There can be little doubt that this is the sheep-farmer's old enemy, liver-fluke disease or rot. We have more than once remarked upon the atrophy which sooner or later always overtakes animals suffering from this malady. As for the lameness, a limp in the right fore leg is an ordinary symptom in chronic or acute hepatitis, or in any affection of the liver, and there are few ailments to which the sheep is liable which do not loosen the wool somewhat. The best symptom as indicating whether a live sheep is touched with the disease, and the one on which most reliance is placed by shepherds and farmers, is the blanching of the conjunctiva, which in the normal state is bright red. This test is a very old one, vide Sir A. Fitzherbert's *Booke of Husbandrye*, published in 1532. 'Turn up the lid of his eye, and if it be ruddye and have red stringes in the white of the eye, then he is sound; and if the eye be white like talowe, and the stringes dark-coloured, then he is rotten.' Of course, the spread of this disease is bringing down the price of sheep ruinously; in many cases farmers, finding the disease appearing among their flocks, have offered to sell at 7s. 6d. per head. Unfortunately, the loss is not merely a present one, but will be felt to a far greater extent when the lambing season comes on. Again, it is a loss which goes beyond the mere value of the sheep, often embarrassing the whole operations of the farm. It is a great pity that the farmer cannot be roused from the apathy with which he regards these and similar visitations. He should see in them a motive for the better draining of his land and more methodical management of his sheep. Properly speaking, the disease is endemic rather than epidemic; and a farmer who buys carefully and keeps his land well drained has no reason to fear the encroachments of this plague.

THE PUBLIC HEALTH

IN THE FOUR WEEKS ENDING 29TH NOV., 1879.

THE unseasonably cold weather that prevailed during the greater part of November caused a considerable increase in the rate of mortality during the month. Only on six of the thirty days in the month did the mean temperature equal or exceed the average for the corresponding period in 100 years.

In twenty of the largest English towns, containing nearly a third of the entire population of England and Wales, 20,620 births and 13,404 deaths were registered during the four weeks ending 29th November. The births were equal to an annual rate of 36.4 per 1,000 persons estimated to be living in the twenty towns, against 37.1 in the corresponding period of 1876. The deaths in November were equal to an annual rate of 23.7 per 1,000 of the nearly seven-and-a-half millions of persons estimated to be living in the twenty towns, against rates increasing steadily from 17.7 to 20.9 in the four preceding months. The death-rate during November in these twenty towns was equal to 22.6 and 24.9 per 1,000, respectively in 1877 and 1878. In spite of

the cold weather the death-rate last month was scarcely above the average for the season.

The lowest annual rate of mortality during November in the twenty towns was 18.3 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follows:—Brighton, 19.1; Oldham, 19.8; Bradford, 19.9; Sheffield, 20.1; Newcastle-upon-Tyne, 22.1; Leicester, 22.3; Birmingham, 22.3; Sunderland, 22.8; Salford, 23.0; Bristol, 23.2; Manchester, 23.3; Norwich, 23.3; London, 24.1; Plymouth, 24.2; Wolverhampton, 24.3; Hull, 24.6; Nottingham, 25.0; Leeds, 26.1; and the highest rate during the month was 27.5 in the borough of Liverpool. In the nineteen large provicial towns, which have an aggregate population somewhat exceeding that of London, the average death-rate in November was equal to 23.3 per 1,000, against 24.1 in London. The high death-rates in Leeds and Liverpool during last month were in great measure due to excessive zymotic fatality; the excess in Hull and Nottingham does not, however, appear to have been due to the same cause.

The 13,404 deaths from all causes in the twenty towns included 2,126 which were referred to the seven principal zymotic diseases, against 1,936 in the corresponding period of last year; 781 resulted from scarlet fever, 532 from measles, 277 from whooping-cough, 226 from diarrhœa, 216 from fever (principally enteric), 87 from diphtheria, and only 7 from small-pox. Compared with the numbers in the corresponding period of 1878, the fatal cases of measles and diarrhœa showed a considerable increase, whereas those of each of the five other diseases were less numerous. The 532 deaths from measles exceeded those in November 1878 by no less than 396; the fatal cases of scarlet fever, however, showed a decline of 94. The deaths from fever (including typhus, enteric or typhoid, and simple) were 98 less last month than in the corresponding period of last year, affording evidence of improving general sanitary condition. The 2,126 deaths returned from these seven diseases during the four weeks under notice were equal to an average annual rate of 3.8 per 1,000 persons living in the twenty towns, against 3.5 in the corresponding period of 1878. The annual zymotic death-rate during last month did not exceed 1.4 per 1,000 in Portsmouth; 1.5 in Oldham; and 2.3 in Bradford; it ranged upwards in the other towns to 4.1 in Liverpool; 4.9 in Newcastle-upon-Tyne; 5.3 in Leeds; and 5.5 in Sunderland. Scarlet fever was prevalent in each of these four last-mentioned towns, and measles was also epidemic both in Liverpool and Leeds. The weekly number of fatal cases of scarlet fever in the twenty towns, which had averaged 103 in August, 115 in September, and 156 in October, further rose to 195 in November; the disease was not so fatal in those towns last month as in November 1878, although the disease was fatally epidemic in Sunderland, Newcastle-upon-Tyne, Liverpool, Sheffield, and Nottingham. The fatal cases of measles showed a general increase; they were proportionately most numerous in Liverpool and Leeds. The deaths from whooping-cough showed a general increase upon the low numbers returned in October. The 87 deaths referred to diphtheria in the twenty towns included no less than 53 in London, while but 34 occurred in the nineteen other towns. Fever fatality in these towns was slightly greater in November than it had been in October; the 216 deaths referred to fever (principally enteric) included 122 in London, while but 94 occurred in the nineteen other towns, having a somewhat larger aggregate population. Only 7 fatal cases of small-pox were recorded in the twenty towns during the four weeks, all of which occurred in London, not a single fatal case being recorded in any of the nineteen provincial towns. The prevalence of small-pox in London, judged by the returns from the Metropolitan Asylum Hospitals, showed a slight increase during November; the number of small-pox patients in these hospitals averaged 45, against 41 in October, and 38 new cases were admitted during the four weeks under notice.

A large portion of the increase in the general death-rate during November was due to the greater fatality from acute diseases of the respiratory organs. The Metropoiltan returns show that the weekly number of deaths referred to those diseases in London, which had averaged 168 and 301 in September and October, further rose to 470 in November, and was equal to an annual rate of 6.8 in 1000 of the estimated population. The annual death-rate from diseases of the respiratory organs and from phthisis was equal to 9.2 per 1000 during November; the death-rate from the same diseases during the month was equal to 9.7 per 1000 in Liverpool, and to but 7.9 in Salford. Unfortunately the Registrar-General's returns do not show the mortality from these diseases in each of the twenty large towns.

In the outer ring of suburban districts around London (having a population estimated at little short of a million persons) the annual death-rate from all causes during November did not exceed 16.9, and the zymotic rate was but 1.8 per 1000. The corresponding rates in inner or registration London were, as before stated, 24.1 and 3.9 per 1000 respectively.

Cities and Boroughs.	Estimated Population at the middle of the year 1879.	During the Four Weeks ending Nov. 29th, 1879.				
		Births.	Deaths.	Deaths from 7 zymotic diseases.	Annual Rate of Mortality per 1,000.	
					All Causes.	7 Zymotic Diseases.
	1	2	3	4	5	6
20 English Towns	7,383,999	20,620	13,404	2126	23.7	3.8
19 Provincial Towns	3,763,131	6,709	10,451	1033	23.3	3.6
London (Reg. Gen.)	3,620,868	10,169	6,695	1093	24.1	3.9
Brighton (borough)	105,608	244	155	18	19.1	2.2
Portsmouth (borough)	131,821	342	185	14	18.3	1.4
Norwich (borough)	85,222	211	152	15	23.3	2.3
Plymouth (borough)	74,293	176	138	18	24.2	3.2
Bristol (city)	209,947	565	374	53	23.2	3.3
Wolverhampton (borough)	75,100	225	140	10	24.3	2.8
Birmingham (borough)	388,884	1,133	665	102	22.3	3.4
Leicester (borough)	125,622	314	215	26	22.3	2.7
Nottingham (borough)	169,396	504	325	35	25.0	2.7
Liverpool (borough)	538,338	1,649	1,133	200	27.5	4.8
Manchester (city)	361,819	960	645	108	23.3	3.9
Salford (borough)	177,849	526	313	50	23.0	3.7
Oldham (borough)	111,318	288	169	13	19.8	1.5
Bradford (borough)	191,046	463	292	34	19.9	2.3
Leeds (borough)	311,860	873	625	127	26.1	5.3
Sheffield (borough)	297,138	819	458	75	20.1	3.3
Hull (borough)	146,347	452	276	26	24.6	2.3
Sunderland (borough)	114,575	327	200	48	22.8	5.5
Newcastle-upon-Tyne (borough)	146,948	380	249	55	22.1	4.9

HEALTH OF OTHER URBAN SANITARY DISTRICTS IN NOVEMBER.

We are enabled, by the co-operation of the several medical officers of health, to publish in the accompanying table *uniform* mortality statistics for 115

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF NOVEMBER 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Abingdon	6,007	20	12	2	3	..	1	1	5	2	..	2	..	..	..	..	..	1	1	..	..	40.5	24.3	4.0	2.0	W. T. G. Woodforde, M.D.
Accrington	30,000	78	42	12	7	2	5	8	8	4	..	..	3	..	..	..	1	10	4	..	..	31.6	17.0	1.6	4.1	J. Ewart.
Altrincham	11,000	28	12	1	2	3	1	1	4	4	..	..	3	..	..	1	..	2	1	..	3	31.0	13.3	4.4	2.2	G. H. Attwell.
Ashton-under-Lyne	33,417	92	76	16	21	4	4	19	12	8	..	3	..	..	3	..	2	16	16	..	10	33.4	27.7	2.9	5.8	W. H. Hughes.
Aston Manor	51,408	170	82	28	20	7	2	9	16	21	..	2	7	3	4	1	4	28	2	3	..	40.2	19.4	5.0	6.6	H. May.
Bangor	7,820	*	13	1	3	..	*	6	3	1	..	..	..	..	..	..	1	2	..	3	..	*	20.2	1.6	3.1	H. Rees.
Barnsley	30,000	90	49	15	14	*	*	8	8	11	..	..	8	..	..	..	3	9	2	1	1	36.5	19.9	4.5	3.6	M. T. Sadler, M.D.Lond.
Barrow-in-Furness	37,500	149	70	24	12	5	8	8	13	14	..	2	2	2	3	3	2	14	3	3	4	48.3	22.7	4.5	4.5	J. Lettle.
Bath	53,432	113	88	*	*	4	2	21	37	8	3	5	..	..	..	..	..	16	6	5	18	27.5	21.4	1.9	3.9	A. B. Brabazon, M.D.
Batley	28,721	62	42	6	13	3	2	12	6	14	..	3	3	1	1	2	4	6	7	4	..	26.3	17.8	5.9	2.5	W. Bayldon.
Beccles	5,000	18	10	2	..	..	1	4	3	..	..	..	..	..	..	..	1	..	3	..	..	46.9	26.0	0.0	0.0	E. B. Crowfoot.
Bilston	24,188	*	37	..	5	12	4	..	10	4	..	1	2	..	..	..	1	..	..	..	..	*	18.6	2.0	0.0	W. M. Hancox.
Bingley	9,000	22	10	..	1	1	1	4	3	2	..	..	1	..	..	1	..	2	..	..	..	29.7	13.5	2.7	2.7	J. W. Craig, M.D.
Bolton	105,000	272	140	45	33	11	7	30	14	35	..	21	4	..	1	4	5	25	5	7	3	33.8	17.4	4.3	3.1	E. Sergeant.
Bootle-cum-Linacre	25,500	84	47	9	14	2	2	16	4	7	..	..	3	3	1	..	..	11	10	2	..	40.1	22.4	3.3	5.2	R. J. Sprakeling.
Boston	15,000	50	17	1	..	..	..	5	11	..	..	..	..	..	..	..	..	5	2	..	..	40.6	13.8	0.0	4.1	W. Clegg.
Bridgnorth	6,000	14	10	2	1	..	..	3	4	..	..	..	..	..	..	..	..	2	..	..	..	28.4	20.3	0.0	4.1	A. Mathias.
Bridport	8,138	15	13	1	5	1	..	3	3	2	..	2	..	..	..	..	..	4	1	..	1	24.0	20.8	3.2	6.4	G. M. Evans.
Bromley (Kent)	14,931	*	5	2	..	..	..	2	1	..	..	..	..	..	..	..	..	1	..	..	..	*	4.4	0.0	0.9	C. O. Baylis, M.D.
Bromsgrove	6,967	19	9	1	..	1	..	4	3	..	..	..	..	..	..	..	..	2	..	..	..	33.2	15.7	0.0	3.5	C. Carey.
Burslem	28,763	83	32	9	3	3	2	6	9	5	..	..	..	..	..	3	2	7	3	1	..	35.1	13.5	2.1	3.0	J. M. Taylor.
Burton-upon-Trent	32,400	125	60	18	12	9	1	10	10	18	..	..	14	1	1	..	2	7	5	2	2	46.9	22.5	6.8	2.6	C. Perks.
Bury St. Edmunds	15,600	38	30	4	2	1	1	8	14	2	..	..	..	..	2	..	..	6	5	..	3	29.6	23.4	1.6	4.7	F. W. Clarke.
Cambridge	34,000	78	61	12	6	5	2	20	16	3	..	..	1	..	1	1	..	15	8	2	7	27.9	21.8	1.1	5.4	B. Anningson, M.D.
Canterbury	20,692	51	44	9	2	1	2	11	19	2	..	..	1	..	..	1	..	10	4	..	11	30.0	25.9	1.2	5.9	F. Wacher.
Cardiff	80,150	262	121	41	17	6	3	35	19	16	..	1	6	..	2	1	6	29	14	9	14	39.8	18.4	2.4	4.4	H. J. Paine, M.D.
Carnarvon	10,299	17	12	..	3	..	1	1	7	1	..	..	..	1	..	..	..	7	3	..	..	20.1	14.2	1.2	8.3	H. Rees.
Chelmsford	9,700	19	11	2	2	..	..	4	3	1	..	..	..	..	..	..	1	3	..	..	5	23.8	13.8	1.3	3.8	E. H. Carter.
Cheltenham	45,000	82	41	7	2	1	2	12	17	1	..	..	..	..	..	1	1	4	2	..	5	22.2	11.1	0.3	1.1	T. Wright, M.D.
Colchester	28,633	81	42	6	4	..	2	19	11	2	..	..	..	..	..	2	..	12	5	1	7	34.4	17.8	0.8	3.1	E. Waylen.
Congleton	12,000	29	10	2	2	..	..	4	2	..	..	..	..	..	..	..	..	3	..	1	..	25.2	8.7	0.0	2.6	P. M. Davidson.
Coseley	23,000	61	27	10	6	..	..	4	7	3	..	..	..	..	..	1	2	7	2	1	..	32.3	14.3	1.6	3.7	J. Eagleton.
Coventry	41,000	93	58	9	9	3	3	11	23	6	..	1	3	..	2	..	..	16	4	..	6	29.6	18.4	1.9	5.1	M. A. Fenton, M.D.
Croydon	69,500	205	99	22	16	..	4	19	38	8	..	5	..	..	..	1	2	22	4	..	23	35.9	17.3	1.4	3.9	C. W. Philpot, M.D.
Dartford	9,377	24	17	3	3	1	*	*	6	2	..	1	..	..	1	..	..	3	3	..	1	31.1	22.0	2.6	3.9	E. Moore.
Derby	80,385	298	152	39	30	*	*	*	38	25	..	..	24	..	..	..	1	35	3	3	13	38.7	19.7	3.2	4.5	W. Iliffe.
Devonport	50,000	*	97	13	31	4	1	30	18	24	..	23	..	..	1	..	..	27	8	2	10	*	25.3	6.3	7.0	J. May, jun.
Dorchester	7,000	19	10	1	..	..	2	4	3	..	..	..	..	..	..	..	..	2	3	..	2	33.0	17.4	0.0	3.5	E. J. Day.
Dover	33,028	96	59	14	10	6	3	12	14	9	..	5	3	..	..	1	..	12	3	3	7	35.4	21.7	3.3	4.4	M. K. Robinson, M.D.
Eastbourne	18,000	*	14	4	3	..	..	4	3	1	..	..	1	..	..	..	..	2	..	..	5	*	9.5	0.7	1.4	E. F. Fussell, M.B., M.R.C.P.
East Dereham	5,762	18	14	2	2	..	2	3	5	1	..	..	..	..	..	1	..	4	1	..	..	38.0	29.5	2.1	8.4	H. B. Vincent.
Fenton	13,000	46	18	2	8	2	..	4	2	6	..	..	6	..	..	..	..	4	1	..	..	43.1	16.9	5.6	3.7	A. V. Griffiths.
Finchley	10,873	24	7	4	..	..	..	1	2	..	..	..	..	..	..	..	..	1	..	..	..	28.8	8.4	0.0	1.2	J. Turle, M.D.
Glossop	17,472	48	44	9	14	3	2	7	9	13	..	5	..	..	2	2	4	14	4	..	3	33.4	30.6	9.1	9.7	J. Rhodes.
Gorton	30,000	103	62	12	22	4	4	12	8	15	..	2	5	..	2	4	2	16	6	2	..	44.8	26.9	6.5	7.0	R. E. Hammond.
Guildford	9,996	26	18	5	3	..	1	3	6	..	..	..	..	..	..	..	..	2	2	1	..	31.6	21.9	0.0	2.4	J. Morton.
Halifax	71,500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. Ainley.
Hinckley	7,000	18	11	1	3	1	3	1	2	4	..	..	4	..	..	..	..	..	1	..	..	31.3	19.1	7.0	0.0	W. H. Griffiths.
Huddersfield	80,245	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. S. Cameron.
Ilfracombe	5,300	14	5	1	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	32.1	11.5	0.0	2.3	E. J. Slade-King, M.D.
Ilkeston	12,057	63	31	12	2	..	3	9	5	4	..	..	..	..	..	2	2	5	2	2	..	54.5	26.8	3.5	4.3	R. Wood.
Jarrow	22,000	70	27	4	6	3	4	7	3	5	..	..	..	..	3	2	..	7	3	..	..	41.5	16.0	3.0	4.1	J. Spear.
Keighley	27,000	57	42	13	10	2	1	12	4	5	..	..	5	..	..	..	..	14	5	..	..	25.7	18.9	2.3	6.3	A. Roberts.
Leamington	23,814	47	35	12	2	5	..	4	12	4	..	..	2	..	..	..	..	8	1	2	..	24.0	17.9	2.0	6.1	J. S. Baly.
Leek	12,191	37	27	8	4	2	2	7	4	4	..	..	2	..	..	..	..	8	1	1	2	31.4	20.8	2.0	7.0	J. J. Ritchie.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Leigh	20,400	60	39	8	13	3	..	5	10	4	..	..	2	..	..	1	1	7	1	1	..	35.3	22.9	2.3	4.1	J. Hall.
Lichfield	7,828	21	14	2	2	2	..	..	8	2	..	..	..	..	..	..	2	2	..	..	..	32.7	21.8	4.5	3.1	G. A. Carter, M.D.
Lincoln	31,526	119	67	15	20	7	2	14	9	14	..	9	2	1	..	2	..	14	7	4	4	49.2	27.7	5.8	5.8	C. Harrison, M.D.
Littlehampton	4,032	8	3	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	1	..	..	24.2	9.1	0.0	0.0	C. Kelly, M.D.
Liversedge	13,458	38	21	9	5	..	1	1	5	2	..	..	..	..	..	..	2	7	1	..	..	34.4	19.0	1.8	6.3	W. J. Sykes, M.D.
Luton	23,600	75	33	13	5	1	1	5	8	2	..	..	..	..	..	1	1	11	1	..	1	38.7	17.0	1.0	5.7	H. Sworder.
Lytham	5,000	12	7	2	..	1	..	2	2	..	..	..	..	..	..	..	..	6	..	..	..	29.2	17.0	0.0	14.6	W. E. Pountney, M.B.
Maidenhead	8,052	21	13	3	7	..	1	1	1	3	..	3	..	..	..	..	..	4	1	..	1	31.7	19.6	4.5	6.0	W. T. G. Woodforde, M.D.
Merthyr Tydfil	50,350	123	86	24	7	4	5	25	21	4	..	..	..	..	..	3	1	23	8	4	1	31.8	22.3	1.0	6.0	T. J. Dyke.
Middlesborough	53,580	178	68	18	11	4	6	14	15	10	..	..	8	..	..	2	..	12	9	3	12	40.4	15.4	2.3	2.7	J. A. Malcolmson, M.D.
Middleton and Tonge	16,550	40	38	14	7	..	2	6	9	2	..	..	2	..	..	..	..	18	5	..	..	25.2	23.9	1.3	11.3	T. B. Knott.
Morley	11,546	54	33	15	7	3	1	5	2	6	..	1	2	..	..	1	2	8	..	2	..	56.9	34.8	6.3	8.4	S. T. Steele.
Neath	12,000	24	13	2	1	..	2	7	1	..	..	..	..	..	..	..	..	2	4	..	2	24.3	13.2	0.0	2.0	G. Ryding, M.D.
Newark	13,426	*	31	3	7	1	1	12	7	2	..	2	..	..	..	..	..	4	4	1	4		30.1	1.9	3.9	A. Ashby, M.B.
Newbury	8,097	16	18	1	2	1	..	3	11	2	..	1	1	..	..	..	..	6	1	1	1	24.0	27.0	3.0	9.0	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	37	24	5	2	..	..	11	6	..	..	..	..	..	..	..	..	4	1	..	..	25.0	16.2	0.0	2.7	St. G. Edwards, M.D.
Oakworth	5,800	14	9	..	2	1	..	4	2	1	..	..	..	..	..	1	..	4	1	..	..	29.4	18.9	2.1	8.4	F. W. Barry, M.D.
Oldham	111,318	287	167	47	44	8	13	34	21	14	..	2	2	1	4	1	4	51	9	4	13	33.6	19.6	1.6	6.0	J. M. Sutton, M.D.
Oxford	37,000	106	53	15	3	4	3	15	13	5	..	..	..	3	1	..	1	5	9	5	5	37.4	18.7	1.8	1.8	A. Winkfield.
Pembroke	15,000	23	21	3	2	1	1	4	10	1	..	1	..	..	..	..	..	4	3	1	..	18.7	17.0	0.8	3.2	D. P. Saer.
Penzance	11,000	27	10	2	..	1	..	3	4	1	..	..	1	..	..	..	..	4	2	..	..	29.9	11.1	1.1	4.4	J. Symons (Deputy).
Peterborough	20,000	52	50	11	15	7	4	6	7	13	..	3	5	..	4	..	1	15	4	1	..	33.9	32.6	8.5	9.8	W. Thomson, M.D.
Poole	11,361	31	25	8	7	2	2	4	2	7	..	6	..	..	..	1	..	..	..	1	1	33.2	26.8	7.5	0.0	H. A. Lawton.
Preston	87,600	309	209	63	46	16	14	40	30	29	..	4	14	..	..	..	11	58	18	5	2	36.8	24.9	3.5	6.9	H. O. Pilkington.
Ramsgate	25,000	51	39	5	6	1	1	14	12	4	..	1	2	..	..	..	1	9	3	4	4	24.8	19.0	1.9	4.4	W. G. Gray.
Reading	40,000	97	55	10	4	..	4	13	24	6	..	1	1	..	1	..	3	6	5	2	6	31.6	17.9	2.0	2.0	J. Shea, M.D.
Redditch	9,686	21	11	4	..	..	1	3	3	1	..	..	..	..	..	..	1	2	..	..	..	28.3	14.8	1.3	2.7	H. Page.
Redruth	9,500	20	16	5	4	1	..	1	5	4	..	..	3	..	..	..	1	2	..	..	..	25.6	20.5	5.1	2.6	J. S. Hichens.
Reigate	17,700	50	18	1	..	2	1	5	9	..	..	..	..	..	..	..	..	7	2	..	4	34.4	12.4	0.0	4.8	E. L. Jacob.
Richmond (Surrey)	17,500	39	28	5	8	1	1	6	7	4	..	..	1	1	2	..	..	6	3	..	..	27.1	19.5	2.8	4.2	J. T. Rowland, M.D.
Rochdale	71,200	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Henry, M.D.
Rochester	18,352	55	29	3	8	5	..	5	8	1	..	..	1	..	..	..	..	9	3	2	1	36.5	19.2	0.7	6.0	J. Knight, M.D.
Rotherham	31,631	141	49	*	*	*	*	*	*	3	..	..	1	..	..	..	2	..	..	..	4	54.2	18.8	1.2	0.0	J. Harowicke.
Rowley Regis	27,000	82	48	14	14	1	4	4	11	8	..	2	2	..	1	1	2	7	2	2	..	31.7	18.5	3.1	2.7	H. R. Ker.
Rugby	8,860	21	13	1	1	1	..	4	6	..	..	..	..	..	..	..	..	3	3	..	..	28.8	17.9	0.0	4.1	G. Wilson, M.D.
Runcorn	14,000	38	14	10	2	..	1	1	..	..	..	..	..	..	..	..	..	3	1	3	..	33.0	12.2	0.0	2.6	R. H. Mouritz.
Ryde	12,800	*	13	1	..	..	1	4	7	..	..	..	..	..	..	..	..	4	2	..	2	*	12.4	0.0	3.8	A. Platt Wilks, M.B.
Skipton	9,100	36	16	5	1	1	1	6	2	..	..	..	..	..	..	..	..	7	2	..	1	51.6	22.9	0.0	10.0	J. W. Barry, M. D.
Smethwick	21,000	92	45	14	8	2	5	11	5	5	..	..	1	1	1	1	1	10	3	..	..	53.3	26.1	2.9	5.8	W. Sutton.
South Shields	61,000	152	94	24	19	9	7	18	17	21	..	3	8	..	3	3	4	19	0	5	..	32.5	20.1	4.5	4.1	J. Spear.
Stalybridge	23,124	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F. J. Roberts-Dudley.
Swansea	65,000	189	150	36	43	11	7	29	24	32	..	..	24	1	..	7	..	49	9	..	4	35.4	28.1	6.0	9.2	E. Davies.
Swinton	7,428	31	8	..	4	1	..	2	1	2	..	..	..	..	1	1	..	1	1	..	..	54.4	14.0	3.5	1.8	C. S. Blythman, M.B.
Taunton	16,138	38	21	5	1	1	1	3	10	..	..	..	..	..	..	..	..	5	1	..	5	28.7	15.8	0.0	3.8	H. J. Alford, M.D.
Teignmouth	7,000	14	4	..	..	..	1	..	3	..	..	..	..	..	..	..	..	2	..	..	..	24.3	7.0	0.0	3.5	W. C. Lake, M.D.
Tiverton	10,400	21	8	2	..	..	..	1	5	..	..	..	..	..	..	..	..	3	2	..	2	26.3	10.0	0.0	3.8	J. P. McNeill, MD. (Dep.)
Torquay	25,000	*	26	5	4	..	..	11	6	1	..	..	..	1	..	..	..	6	5	..	1	*	12.7	0.5	2.9	P. Q. Karkeek.
Toxteth Park	8,000	14	5	..	..	..	..	3	2	..	..	..	..	..	..	..	..	1	2	..	..	21.3	7.6	0.0	1.5	R. W. Pendleton.
Tredegar	16,000	50	35	3	4	8	4	9	7	5	..	..	..	..	..	5	..	8	2	4	4	28.0	26.6	3.8	6.1	G. A. Brown.
Truro	11,049	25	15	3	3	..	..	3	6	..	..	..	..	..	..	..	..	2	1	..	..	27.5	16 5	0.0	2.2	E. Sharp.
Tunstall	15,300	32	26	15	7	..	..	3	1	3	..	..	1	..	1	1	..	7	1	..	..	25.4	20.7	2.4	5.6	J. P Edwards.
Tynemouth	43,531	54	59	*	*	*	*	*	*	16	..	10	2	..	..	..	4	4	5	2	..	16.2	17.7	4.8	1.2	T. Stephens.
Wallasey	20,000	45	18	2	2	..	..	7	7	..	..	..	..	..	..	..	..	3	2	1	..	29.3	11.7	0.0	2.0	J. Byerley.
Warrington	37,000	155	45	13	7	3	1	11	10	7	..	..	1	..	1	2	3	7	5	3	5	54.6	15.9	2.5	2.5	G. W. Joseph.
Wednesbury	26,000	76	28	11	9	1	..	5	2	1	..	1	..	..	..	..	..	11	1	3	..	38.1	14.0	0.5	5.5	J. C. Garman.
West Bromwich	53,600	174	108	30	35	*	*	*	20	14	..	4	4	..	3	1	2	..	..	..	..	42.3	26.3	3.4	0.0	J. Manley.
West Derby	32,263	77	55	8	12	4	5	15	11	15	..	2	7	..	..	3	3	8	9	..	..	29.0	20.7	5.7	3.0	W. Carter, M.B.
Weymouth	14,000	25	18	1	3	..	1	4	9	..	..	..	..	..	..	..	..	5	3	..	3	21.7	15.6	0.0	4 3	H. Tizard, M.D.
Widnes	22,000	59	42	16	7	2	1	12	4	6	..	..	2	1	2	..	1	11	4	4	..	32.6	23.2	3.3	6.1	W. Cooper.
Wigan	45,432	188	147	39	38	*	*	*	21	34	..	..	29	..	..	..	5	..	..	*	23	43.2	33.7	7.8	0.0	H. C. Barnish.
Willenhall	18,943	54	21	8	7	1	1	3	1	3	..	..	1	..	..	..	2	4	1	2	..	37.2	14.5	2.1	2.8	W. H. Hartill.
Withington	15,000	48	17	2	2	..	..	2	11	..	..	..	..	..	..	..	..	7	1	..	..	33.4	11.8	0.0	4.9	T. C. Railton, M.B.
Worthing	9,365	20	7	..	..	..	..	1	6	..	..	..	..	..	..	..	..	..	..	..	..	26.0	9.1	0.0	0.0	C. Kelly, M.D.
York	46,436	131	87	26	12	3	4	27	15	10	..	2	7	..	..	..	1	19	14	1	3	36.8	22.8	2.6	5.0	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

urban sanitary districts relating to November. The number of sanitary districts included in the corresponding tables for the four preceding months did not exceed 36, 55, 67, and 104, respectively. This progress may be regarded as satisfactory, especially as we have promises of a considerable accession to the number of contributing medical officers of health from the commencement of 1880. The estimated population of the 115 urban sanitary districts, for which we are enabled to publish November mortality statistics, is little short of three millions of persons, the districts being situated in various parts of England and Wales.

On the last day of November 158 prepaid postcards were addressed to the medical officers of health of as many sanitary districts; 115 of these were returned, with the requested information, in time for publication in our present issue. It is satisfactory to note that very few of the medical officers of health who contributed statistics for October have failed to transmit their November cards in time for publication. We have not, however, yet received answers from a considerable proportion of the forty-one medical officers of health whose co-operation we first requested at the end of last month.

Our endeavours to provide for the publication of these *uniform* monthly mortality statistics have hitherto received most cordial support from the large majority of the medical officers of health whose co-operation we have invited. The objections that have been urged to co-operation have, in the main, been based upon the calls of other professional engagements, which did not permit of such an addition to their labours in connection with public health duties. In a few instances, however, exception has been taken to the publication of statistics for small districts relating to so short a period as a month. We firmly believe that the public and local utility of such trustworthy mortality statistics far outweigh any mischief that could arise from their possible misuse, or from ill-considered conclusions based upon them. We are fully aware that annual rates of mortality, etc., based upon monthly figures for small districts, cannot be safely used as evidence of comparative sanitary condition. There is little risk, however, of our readers making so palpable a misuse of our figures. The facts and not the calculated rates we consider to be the most valuable portion of the tabie; the rates are added merely to afford a means of judging of the relative importance of the facts. It appears to us of real importance to know how many, if any, deaths from the principal zymotic diseases were recorded within a sanitary district during any month; the size of that district scarcely affects the value of that information, either to the medical officer of health of that or of neighbouring sanitary districts.

The annual birth-rate in 107 of the 115 sanitary districts appearing in the acompanying table averaged 34.9 per 1000, against 34.6 and 35.9 in September and October; in the twenty large English towns the average birth-rate in November averaged 36.4. The medical officers of health of seven of the districts have been unable to furnish the number of births registered during the month. As the birth totals form an important and essential portion of sanitary and vital statistics, we invite the attention of medical officers of health to an article in another column on the subject of registrars' mortality returns.

The annual death-rate in the 115 sanitary districts averaged 19.9 per 1000 during November, and was below the average death-rate in the twenty largest towns. The death-rates in these sanitary districts showed a marked general further increase upon those which prevailed during the three preceding months; this was mainly due to the far greater fatality of diseases of the respiratory organs, the result of unseasonably early and severe winter weather. The annual rates in November were unusually low, and below 10 per 1000, in Bromley, Teignmouth, Toxteth Park, Congleton, Worthing, Littlehampton, and Eastbourne. A considerable number of the other district rates were also satisfactorily low.

In the 115 urban sanitary districts the annual death-rate from the seven principal zymotic diseases averaged 2.8 per 1000 in the month of November, against 3.8 in the twenty large towns. No death from these diseases was returned in 27 of the districts; in the remaining districts the zymotic death-rates last month ranged upwards to 6.0 in Swansea (scarlet fever), 6.3 in Morley, 6.5 in Gorton, 7.0 in Hinckley (scarlet fever), 7.5 in Poole (measles), 7.8 in Wigan (scarlet fever), 8.5 in Peterborough, and 9.1 in Glossop (measles). No death from small-pox was registered in any of the 115 town districts. Measles was fatally prevalent in Bolton, Devonport, Dover, Glossop, Keighley, Lincoln, Poole, and Tynemouth; scarlet fever in Burton-upon-Trent, Derby, Fenton, Hinckley, Middlesborough, Preston, Swansea, West Derby, and Wigan. The deaths referred to fever (principally enteric) in the 115 town districts were again satisfactorily few, though the disease was somewhat prevalent in Gorton, Merthyr Tydfil, Swansea, and Tredegar. The deaths from fever in Swansea further declined to 7, against 30 and 19 during September and October.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 4.3 per 1,000 persons living in the 115 urban sanitary districts, showing a considerable further increase upon the rates in the two previous months of September and October, which were 2.2 and 3.2 per 1,000 respectively. During November the fatality of lung diseases showed a marked excess in Glossop, Lytham, Newbury, Skipton, Swansea, Middleton and Tonge, and Peterborough.

Infant mortality, measured by the proportion of deaths under one year of age to deaths registered, averaged 145 per 1,000 in the 115 urban sanitary districts, against 116 in the twenty larger towns.

We take this opportunity to thank all medical officers of health who have shown their appreciation of our efforts to publish uniform trustworthy mortality statistics of urban sanitary districts, by undertaking the trouble of filling up and transmitting our monthly cards. We hope, and have reason to expect, that our lists of contributing sanitary districts will be considerably extended from the commencement of 1880, and scarcely need repeat that any medical officer of health who finds himself able and willing to contribute shall be regularly supplied with cards for the transmission of the requested information. It will afford us great assistance in the publication of these statistics if medical officers of health will transmit their cards as soon after the close of each month as they may find possible; the available period for revising the calculated rates and printing the table is exceedingly short, and can only be lengthened by the prompt transmission of the cards after the end of each month.

SPECIAL REPORTS.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on November 21st, Dr. Bristowe, President, in the chair. After the minutes were read, the Report of the Council was brought up on 'The publication of the Transactions of the Society,' which it was determined in future should be included in the Annual Report, and termed the *Proceedings;* that the type should be of the size employed by the Royal Society; and that other improvements should be introduced. As regards the removal of non-pauper cases of infectious diseases to the Hospitals of the Metropolitan Asylum Board, it was recommended that the further consideration thereof should stand over until a reply as to the definition of a 'pauper' should be received from the President of the Local Government Board. The Report also stated that the Council are of opinion that the Artizans and Labourers Dwellings Act (1868), Amendment Act, 1879, will be found to be comparatively unworkable in consequence of the alterations introduced in the Bill since it was submitted to them, and received the approval of the Society, subject to a few amendments being made. A letter was read from Miss Rose Adams, Secretary of the Ladies Sanitary Association, asking if the Society had issued any circular letter on the symptoms of rabies, to which a reply was sent that it had not.

Dr. T. W. Waterworth, Medical Officer of Health for St. George's, Southwark, and Dr. E. Gwynne, Medical Officer of Health for Hampstead, were elected as Metropolitan Members; Mr. Lord, late Medical Officer, was enrolled as a Past Medical Officer. The following gentlemen were then elected Extra-Metropolitan Members, viz., Mr. C. T. Conolly, Medical Officer of Health for Tottenham; Mr. E. J. Day, of the Urban and Rural Sanitary District, Dorchester; and Mr. T. Moore, of Petersfield Rural Sanitary District. The undermentioned gentlemen were also nominated as Extra-Metropolitan Members—Dr. Kelly, Professor of Hygiene, and Medical Officer of Health; and Dr. Saunders, Medical Officer of Health for part of Middlesex and Hants.

Mr. Lovett then mentioned the discrepant results published lately as to the value of disinfectants, especially with regard to the value of that most generally used, viz., carbolic acid; and thought that the consideration thereof might be referred to the Council. Dr. Tripe said that disinfectants, and deodorants, and anti-putrefactives are often confounded together. Thus thymol, one of the most powerful anti-putrefactives known, has not been proved to be a disinfectant; *i.e.*, a substance having the power of taking away the infective property of a zymotic poison. It was then agreed that some 'notes' on this subject be read at the next meeting of the Society on the third Friday in December.

Dr. Tripe then read his paper on Poisoning by Sausages and other articles of food, in which, after alluding to the rarity with which death or disease from this cause has been recorded, he gave a history of outbreaks of diarrhœa, etc., in the Hackney District, from eating sausages and dripping; also abstracts of cases that had occurred elsewhere from eating tinned meat and bread pudding. In the first, which occurred in 1859, there were sixty-four persons known to have been attacked out of sixty-six who ate of sausages, which were made from the beef of a cow and pork fat, both of which were sworn at the inquest as having been good when sold. The symptoms, which were detailed at considerable length, were those of a narcotic irritant poison; the first unpleasant feelings being nausea, a sense of acridity in the throat, giddiness, and more or less prostration, rapidly followed by vomiting and diarrhœa, with, in most cases, severe pains of the bowels and in the legs. The vomiting and purging generally came on in three or four hours, but did not occur in some persons until from twenty-four to thirty hours had elapsed, and lasted, more or less, from two to three days. Death ensued in one case after a week's illness, the prostration being excessive, and the delirium lasting for nearly the whole time. The sausages were analysed by the late Dr. Letheby, as well as by Dr. Tripe, without any poison being detected; but Dr. Letheby obtained an offensive smelling extractive from the sausage, although it was quite sweet when he received it. The history of the poisoning by dripping has already appeared in this Journal (Part 2, New Series Aug. 15). The symptoms were very similar to those in the sausage case, except that the cerebral affection was not so severe. The vomiting and purging came on in about the same time, and lasted from two to four days, leaving the patients in a very weak state. The number of persons attacked was twenty-nine out of thirty-one and also an infant, who was suckled by its mother, and died, although it did not eat of the dripping. Nothing was found on analysis; but on a microscopic examination numerous nucleated cells and bacteria were detected. An account of the poisoning of twenty-one persons by tinned corned ox tongues, extracted from the *British Medical Journal*, was next read, in which similar symptoms occurred—the collapse, cramps in the legs and pain in the stomach being severe. A careful examination—both chemical and microscopical—was made, but without anything being detected except a little iron rust on the meat in the vicinity of the solder. Dr. Tripe considered that the cause in all three instances was the same, viz., the presence of bacteria, which have been frequently found in the discharges of persons affected with epidemic diarrhœa. He next briefly referred to eight cases and two deaths from diarrhœa, vomiting, prostration, etc., occurring after eating bread pudding, in which the only cause to be found was the presence of mycelium threads (a fungus), and other similar structures. (SANITARY RECORD, vol. ix, p. 257.)

Dr. Bate (Bethnal Green) asked Dr. Tripe if he had had any cases of poisoning by cheese, as he had met with an instance in which six persons and a little dog suffered severely from vomiting and diarrhœa, etc., after eating cheese, which on analysis gave no evidence of poison. Dr. Bindon said he had met with nucleated cells such as those described by Dr. Tripe in the discharges of persons suffering from epidemic diarrhœa. Dr. Tidy said that he had analysed the sausages in three instances, and some mutton in another, where the eating had been followed by severe diarrhœa. He had found a peculiar bitter principle in the chloroform residuum which he had never met with under other circumstances. The President, after proposing a vote of thanks to Dr. Tripe, said that similar symptoms resulted in his family from eating shrimp sauce, the only person escaping being a servant who did not partake of the sauce. Dr. Tripe, in reply, said that he had seen several cases of poisoning by shrimps, mussels, crab, and cockles, and had experienced some ill effects by

eating a few of the last-named shell-fish, and all his family who ate of them suffered more or less severely; but this kind of poisoning did not, so far as he had seen, produce great prostration after the diarrhœa had ceased, as in poisoning from meat.

Mr. S. R. Lovett then read a paper on the recent outbreak of typhus fever in Bloomsbury, which he attributed in great measure to the insanitary conditions of the houses occupied by the patients, being portions of the sites condemned under a scheme for providing better dwellings for the poor. He did not think the Metropolitan Board at fault for the delay, but the Act itself. There were two outbreaks—one of which commenced in a dilapidated building in Lincoln Court, and spread from thence to an adjoining place — Orange Court — where several cases occurred. The second outbreak began at 22, Little Earl Street, amongst some hop-pickers, who had been to Cobham, and slept in a small shed which was much overcrowded. There were some other cases of typhus at Cobham, which were removed in public conveyances. In one notable instance a man named Mahoney removed a sick woman to Gravesend, and, on being taken ill himself, was sent by train to St. Thomas's Hospital, where he was at once admitted for typhus. There were altogether ten cases amongst the former group; and he believed the disease had been stamped out by disinfection and the removal of the infected persons to hospitals. Altogether there were sixteen cases of typhus in St. Giles's from the infection brought from Cobham. Dr. Thomas believed that destitution had much to do with the outbreak. Dr. Tripe thought that the wet weather and consequent overcrowding of the shed materially assisted in causing the disease. The President then said that he believed there is no risk incurred by having a few cases of typhus in a general ward of a hospital; but there is by having several in a small ward or room, as shown by the infection of the nurse attending on the two children who were treated in a separate ward.

A letter was then read from Dr. Harrison, showing the injury to health that had resulted in two instances by not requiring every one keeping a cow to be registered when any person outside the family was supplied with the milk. In both of these typhoid was spread amongst the inhabitants of small villages, by milk and butter being supplied by persons attending alternately on the sick and in the dairy. Dr. Tidy then made a strong objection to the course taken by the officers of the Metropolitan Board of Works in using tar and silicated paint in the sheds. The meeting then adjourned.

AWARDS OF THE SANITARY INSTITUTE.

WE were unable in our present issue to publish a complete list of the awards of the Sanitary Institute to exhibitors at the recent Sanitary Congress at Croydon, as the official announcement reached us too late for insertion. We therefore now publish them in full.

Medals have been awarded to the undermentioned Exhibitors:—Fraser Bros., Commercial Road East, London, for Patent Portable Disinfecting Apparatus; Charles W. Walker, 1, Chivalry Road, Wandsworth Common, for Acid Pump and Syphon; James Sinclair, 104, Leadenhall Street, for 'Tyndall's' Smoke Respirator; William Lascelles, 121, Bunhill Row, London, for Concrete Bath, in one piece; Willcocks and Co., Burmantofts, Leeds, for Silica Glazed and Enamelled Fire Clay Bricks and Faïence; Hamilton and Co., 255, Kingsland Road, London, E., for Patent Prismoidal Pavement, and Floor Lights; W. P. Wenham, 81, Church Street, Croydon, for an Improved Open or Closed Range Kitchener; H. Doulton and Co., Lambeth, for Patent Anti-Percussion High-Pressure Valves; Aveling and Porter, Rochester, for Improved Six-Ton Steam Road Roller.

Certificates of Merit have been awarded to the undermentioned Exhibitors:—Peter Hinckes Bird, F.R.C.S., 1, Norfolk Square, London, for his method of 'Costless Ventilation;' U. Knell, 77, Fore Street, London, E.C., for his 'Imperial' Ventilating Window; E. Headly and Son, Exchange Ironworks, Cambridge, for Patent Hose Reel; Benjamin Finch and Co., Sanitary Works, 181, High Holborn, London, W.C., for Large-way Waste Plug, with Protective cover; Dr. Ancell Ball, Spalding, Lincolnshire, for Patented Folding Invalid Bed; Chorlton and Dugdale, 19 Blackfriars Street, Manchester, for 'Excelsior' Spring Mattress Hospital Beds; Pocock Bros., 235, Southwark Bridge Road, London, for Universal Tubular Air and Water Bed; George G. Bussey and Co., Museum Works, Rye Lane, Peckham, London, for Patent Spring Mattress; George Bray and Co. Blackman Lane, Leeds, for Improved Gas Burners; George Jennings, Stangate, London, for 'Artizan Dwellings' Sink; Willcocks and Co., Leeds, for Fire Clay Sanitary Sinks and Water Troughs; G. E. Webster and Co., Market Street, Nottingham, for Webster's Patent Photometer; Legrand and Sutcliffe, 100, Bunhill Row, London, for Improvements in internal driving of Tube Wells; Selig, Sonnenthal and Co., Lambeth Hill, Queen Victoria Street, E.C., Patent Safety Belt Shippers; J. C. Edwards, Trefynant, Ruabon, for Dean's Patent External Drain Traps, with movable receptacle; Beard, Dent, and Hellyer, Newcastle Street, Strand, for Patent 'Ventilating Drain Syphon;' Hygienic Stove and Grate Company, 15, Peel Buildings, Birmingham, for 'Eagle' Sanitary Trap, for superseding Bell Traps; H. Doulton and Co., for Decorative Tiles for covering walls and floors; W. P. Wenham, 81, Church Street, Croydon, for Boyle's Mica Valved Outlet Ventilator; George Jennings, Stangate, London, for Universal Shampooing Apparatus; Billing and Co., Hatton Garden, London, for the Workman's Cooking Stove, and other Improvements in Gas-Cooking Stoves; Moule's Patent Earth Closet (Limited), 5A, Garrick Street, London, W.C., for Patent Earth Closet; Sanitary Appliance Company, Factory Lane, Salford, for Morrell's Patent Cinder-Sifting Ash Closet; John C. Onions (Limited), Birmingham, for Moser's Patent Self-Acting Dry Closet; J. E. Ellison, Leeds, for Conical Ventilators; James Sinclair, 104, Leadenhall Street, London, E.C., for Chemical Fire Exterminator; Thomas Waller, 47, Fish Street Hill, London, E.C., for Cooking Stove with Warm-Air Chamber; Samuel Stretton, M.R.C.S., Kidderminster, for a Folding-Bier and Car, for simplifying funerals; S. & E. Ransome and Co., 10, Essex Street, Strand, W.C., for Milwaukee Glass Lantern (for Hurricane Lantern); Mrs. Amelia Lewis, for Patented Tin Cooking Utensils; F. W. Clark's Portable Gas Apparatus Company (Limited), Great Queen Street, Lincoln's Inn Fields, for Patent Portable Gas Apparatus, for Manufacturing Gas from Gasoline; J. G. Stidder and Co., Southwark Bridge Road, for Swivel, Lock Plug and Overflow for Sinks; Hammond and Hussey, Croydon, for Hornibrook's Patent Catchment Grating for Steep Gradients; G. E. Pritchett, F.S.A., Bishops Stortford, for Barometrical and Thermome-

trical Instruments; H. Doulton and Co., Lambeth, for Disconnectiug Gully, with back and side entrances and iron grating; R. Adams, 7, Great Dover Street, London, for Patent Adjustable Shoe, and Regulating Spring Hinge for Swinging Doors; R. Adams, 7, Great Dover Street, London, for Fanlight Openers and Casement Fasteners; The Patent Victoria Stone Company, 305, Kingsland Road, London, N., for Artificial Stone Tubes; Henry Sharp, Jones, and Co., Bourne Valley Pottery, Poole, Dorset, for Rock Concrete Tubes; G. E. Pritchett, F.S.A., Bishops Stortford, for Improvements in Hollow Tile Flooring.

The Judges recommended that two classes of exhibits should be excluded from awards of Medals—namely, those which were exhibited at Leamington or Stafford, and to which a Medal was then awarded; some of which they recommended to receive Certificates, and these we have distinguished in the foregoing lists by asterisks; and, secondiy, objects exhibited or invented by any of the Judges themselves, such as Mr. William Eassie's exhibit of Specimens of Bad Plumbing, and Mr. Rogers-Field's Self-Acting Flush Tank, exhibited by Messrs. H. Doulton and Co.

The Judges also recommended that the undermentioned articles should be tested at the expense of the Exhibitors, if they are willing to incur the same:—Water Heaters and Detached Bath Heaters; Arcanum Plating Works, Birmingham, The Arcanum Process of Silver Plating Steel. Disinfectants:—Mackey, Sellers, and Co., 102, Bouverie Street, London, W.C., Oxychlorogene; Sanitas Company, Sanitas Disinfecting Fluid; W. Jones, 37, Mincing Lane, London, Lustro-Disinfecting Fluid; Jeyes' Sanitary Compounds Company, Jeyes' Perfect Purifier; Sutton and Phillips, Stowmarket, 'Sporokton' (Professor Tuson's Patent); W. T. White, 232, Kennington Road, Euchlorine Disinfectant; F. C. Calvert and Co., Carbolic Acid.

Aërated Waters: Richard Evans and Co., Wrexham, Zoedone (Patentee, David Johnson, F.C.S.); James Packham, Croydon, Aërated Waters in Silvered Syphons; Spécialité Seltzer Water; Newry Mineral Water Co. (Limited), Islington, Liverpool, Ginger Ale, Ginger Beer, Lemonade, etc.; Samuel Gulliver and Co., Aylesbury, Mineral and Aërated Waters.

Filters: G. H. Flood and Co. (Limited), Holland Street, Blackfriars Road, Bailey Denton's Filter; P. A. Maignen, 5, Tower Street, London, Patent 'Filtre Rapide.'

Hopper Closets (one specimen each): Doulton and Co.; Beard and Dent, Artizan Closet; Warner, Sharpe's Hopper Closet; William Ramsey (Limited), Dodd's Ventilating Hopper Closet; Stidder, Infirmary Closet; Thos. Smith, Old Kent Road; W. and S. Carsley, Bartholomew Close, Jewel's Hopper Closet Basin with Washer Clip, and Iron Trap with connecting T piece in one casting.

Wash-out Closets (one specimen each): Henry Owens; Doulton and Co.; Ramsey, Dodd's Ventilating Wash-out; Stidder, Single-Arm Flushing Monkey; Bostel, Brighton Excelsior; Doulton and Co., Lambeth, Fowler's Self-acting Closet.

Miscellaneous: Ryan and Ryan, Rain-Water Percolator; Frederick Gardner, Hereford Road, Bayswater, Patent Level Cot for use on shipboard; The Silicate Paint Company, Charlton, Kent, Enamel Paint Petrifying Liquid and Paints exhibited; Keen and Sons, Gay's Solution; S. & E. Ransome and Co., Essex Street, Strand, Porous Slabs and Rain-Water Filters; Pamphillon and Co., Whittlesford, Cambridge, Patent Smoke Consumers (Peyton's Patent); William Lascelles, Bunhill Row, Concrete Construction; Stidder and Co., Southwark Bridge Road, Urinette; Potter and Sons, Oxford Street, London, H. Saxon Snell's Patent Ventilating Hot-Water Open Fire-Grate, "The Thermhydire;" Benjamin Finch and Co., High Holborn, London, a 4-inch Ball Valve for large Cisterns with Balanced Valves; W. Woollams and Co., London, Paper Hangings free from Arsenic; W. S. Carsley, Bartholomew Close, Urinals, Iron Traps, and Sink, coated by Professor Barff's process; H. Braithwaite and Co., Swinegate, Leeds, Patent Syphon for Water-closet Cisterns.

Washing and Wringing Machines (one specimen each): J. M. Bell and Co., Oxford Street; Thomas Bradford and Co., 140, High Holborn; Donald and Co., 33, Cornhill; Harper Twelvetrees, 40, Finsbury Circus; Thomas Green and Son (Limited), 54, Blackfriars Road, Monarch Washing, Wringing and Mangling Machine; Ryan and Ryan, Imperial Arcade, Ludgate Hill.

Until the deferred trials have been carried out, the Judges are unable to award the Gold Medal of the Institute.

The Judges were—Dr. W. H. Corfield, Mr. Rogers Field, Mr. W. Eassie, and Dr. H. C. Bartlett.

MEDICAL OFFICERS' REPORTS.

ABERGAVENNY.—On the whole Mr. Steele's report for 1878 shows progression, though the deadlock which seems to have arisen with regard to the disposal of the sewage of the town through the action of the River Conservators threatens to have mischievous results. As regards cleanliness generally, a decided change for the better is reported in some places. There are still a good many noxious trades in the district, and the question of the provision of a public abattoir deserves consideration. Last year was very healthy for Abergavenny. The death-rate was 17 per 1,000, the lowest on record, and there was an almost complete immunity from zymotic diseases.

BURTON-ON-TRENT RURAL.—In the second division of this district 1,009 births and 391 deaths were registered in 1878. The estimated population was 20,561, and the birth-rate was therefore 49.3, and the death-rate 19 per 1,000. Of the total number of deaths, 100 occurred in infants under 1 year of age. Commenting on this, Mr. Hooper observes that he is convinced that improper feeding is the cause of a large proportion of the diseases from which young children die; and he observes that the practice which is becoming so prevalent—of entering infants into so-called benefit societies—has a tendency to produce a certain amount of criminal neglect. During the year there was a visitation of scarlet fever, which, although of a mild character, hung about for a considerable period. Mr. Hooper's advice that the authority should itself undertake systematic scavenging for the larger villages we heartily endorse.

HACKNEY.—We have already given (vol. x, p. 123), the principal features of the mortality in this district during 1878, and it remains only to speak of the operations of the sanitary department, and to congratulate Dr. Tripe upon the masterly way in which he has handled his figures. During the year 4,066 articles were received at the disinfecting chamber of

the district for disinfection, and in addition 416 rooms were fumigated. More than 18,000 loads of dust were removed, at a cost of a little over £3,000. The mortuary was of considerable service, 59 dead bodies being deposited therein. The number of nuisances was rather below the average, but still reached the respectable figure of 5,912. Notices were served in 697 houses for disinfection of the whole or some of the rooms, in consequence of infectious disease having appeared therein. The number of premises inspected during the year, some of them several times, was 8,212, or nearly one-third of all the houses in the district. Of 6,104 houses visited by the inspectors under the provisions of the Sanitary Act, 2,403 were found defective as regards one or more sanitary necessities, or were so dirty or dilapidated as to be injurious to health. As analyst Dr. Tripe examined 121 samples of food and drink, with the result of finding 17 adulterated. Twenty-four samples of milk, 6 of butter, 8 of tea, 10 of sweets, and 10 of ices were examined.

LEICESTER.—This town rejoices in the possession of a medical officer of health, and an assistant medical officer of health, each of whom holds different opinions on the subject of the causation of the infantile diarrhœa which afflicts the town every summer. The views of Dr. Johnston, the assistant medical officer, have already appeared *in extenso* in our columns (p. 43), and the opinions of Dr. Crane, the medical officer of health, will have been sufficiently gathered from Dr. McCook Weir's endorsement of them (p. 90). This much-vexed question need not therefore now be entered upon. With the exception of the diarrhœa mortality, the town was fairly healthy during the year. The total number of deaths was 2,500, equal to a rate of 20.5 per 1,000, the lowest recorded for fifteen years. Of these deaths, 1,370 were under five years of age, viz., 981 under one year, 235 between one and two, and 154 from two to five years. The deaths from the whole class of zymotic diseases amounted to 512, 302 of which were in infants under one year, and 140 between one and five years. In other words, 86.3 per cent. were children who had not completed their fifth year. Small-pox caused but one death; measles, which was least prevalent in the winter quarter, 45; diphtheria, 5; whooping-cough, which, next to diarrhœa, was the most fatal, 82, or 3.3 per cent. of the total number of deaths from all causes. Typhoid fever caused 31 deaths, and in commenting upon this mortality Dr. Johnston expresses the opinion that many of the cases of infantile diarrhœa are but modified forms of typhoid fever. He argues that the death registers for the last quarter of a century show that in the great majority of the years, a rise or fall in typhoid fatality was accompanied by an increase or decline in the deaths from diarrhœa, that both diseases, with but few exceptions, prevailed during the same season of the year, and that the districts of the town 'unhealthy' from each disease were enclosed within similar boundaries. Whether this view is right or wrong cannot possibly be decided without an independent local inquiry, such as has long been urged upon the Local Government Board.

MARKET DRAYTON RURAL.—The chief sanitary want of this district seems to be a pure and sufficient supply of water. In most of the populous places a great deficiency in the supply is reported by Dr. Sandford, and such water as exists is impure and fouled by soakage from privies. This is a matter which needs early attention, and with the enlarged powers which they now possess, the sanitary authority should lose no time in improving matters in this respect. The sewerage of Market Drayton is also susceptible of considerable improvement. During the year 1878, a total of 237 deaths were registered in the district, equal to a rate of 15.85 per 1,000. Zymotic diseases caused fifteen deaths, five of these being from typhoid fever. Children under five years died to the number of fifty-six, and seventeen persons died of old age.

MERTHYR TYDVIL URBAN AND RURAL.—As these reports are both from the glowing pen of Mr. T. J. Dyke, it will be convenient to take them together. In the urban district, with a population of 50,354 persons, there were 1,132 deaths during 1878, equal to a rate of 22.4 per 1,000. This is 2.4 less than the average for Merthyr, and 0.7 more than the rate for England and Wales. The deaths of children under one year of age numbered 251, or 15.1 of the registered births, and the child-rate was equal to 38 per cent. of all the deaths. Zymotic diseases caused 96 deaths, whooping-cough alone being responsible for 42. Two serious outbreaks of typhus fever, one in Dowlais and one in Merthyr, are reported, and their circumstances stated in considerable detail. In the former epidemic, which seems to have arisen entirely from contagion, 53 cases occurred; but the number of cases in the latter is not stated. Fifty of the patients were removed to the two infectious hospitals, and a total of 14 deaths were registered from the disease. During the year 'very many' persons were ill of enteric fever, and 38 deaths occurred. In no instance was the malady traced to impure water, but in every case a 'local cause sufficient to bring it on' was discovered. Diarrhœa was conspicuous by its absence, seven children under two years and one person, aged 65 years, being the only recorded cases. Mr. Dyke's description of his personal action, which occupied him at least ninety days of ten hours each, is very minute, but does not admit of condensation. Though the Local Board has done very much, and has expended £300,000 in sanitary improvements, a very great deal still remains to be accomplished. People are still so crowded in badly ventilated houses as to be sources of disease not only to themselves, but to their neighbours; and drainage works improperly executed, imperfect sanitary appliances, and streets and lanes unmetalled, unchannelled, and unpaved still exist. The report on the rural district calls for no particular remark. The death-rate was 21.6 per 1,000, 44 per cent. of the mortality being in children under five years of age. Diphtheria caused 12 and enteric fever 13 deaths. The district generally seems to be as dirty as it can well be.

NEWCASTLE-ON-TYNE.—We cannot profess to admire the manner in which Mr. Armstrong arranges his report, however gratifying it may be to the official mind to have the advice given and the action taken on that advice separated and split up into different sections in the most marked of fashions. But in the matter of the report there is nothing to quarrel with. It shows Mr. Armstrong to be working steadily and earnestly, considerably in advance of the Town Council as yet, but still with some hope that they will eventually reach his standard. A gigantic amount of sanitary work still has to be done in the borough; and a free application of the Artisans' Dwellings Act seems desirable to clear away the wretched tenement property that is now being patched up. The disposal of refuse, and the cleansing of privies and middens is another very large question, the importance of which has been pointed out

by the medical officer of health, but which still remains undealt with. There is evidence, however, of some considerable amount of improvement going on in the borough, and it is satisfactory to observe that the old fever hospital, which has been in use for seventy years and is unwholesome and dilapidated, is likely to be replaced by a proper hygienic building. The death-rate for 1878 (23.7 per 1,000) was higher than that for 1877 by 1.4. Of the total number of 3,423 deaths, 888 were those of children under one year of age, and 119 were uncertified. Zymotic diseases caused 631 deaths, 219 of which were from scarlatina, 218 from diarrhœa, 9 from typhus, and 52 from enteric fever. A total of 467 cases, including 311 of scarlet, 64 of enteric, and 27 of typhus fever (of which there was a smart outbreak) were made known to the sanitary department during the year. Sixty-five patients were treated at the Fever Hospital, which, despite its defects, seems to have been of much service; and a large quantity of infected bedding and clothing was purified in the disinfecting apparatus. Mr. Armstrong winds up, by adverting to the want of legal powers, for amongst other things, compelling the registration of all cases of infectious disease, for prescribing the mode of ventilation of infected persons and things, and for preventing overcrowding in Sunday schools.

PORTSMOUTH.—A large part of Mr. Turner's very interesting report is taken up with a continuation of the discussion on infantile diarrhœa, the gist of which has already been given in vol. x, p. 249. The other feature of importance, an outbreak of typhoid fever due to milk, will receive separate notice; but it may be remarked here that Portsmouth has the highest death-rate of any of the twenty large towns from this disease. Mr. Turner says that the flatness of the sewers, insufficient sewer and house-drain ventilation, and the defective construction of houses are the reasons for its sustained prevalence. The first condition may be unimprovable, but the last two surely admit of rectification. The total number of deaths during the year was 2463, 1,006 of which (or 40.8 per cent.) were in children under five. The general death-rate was 19.02, or slightly below the average of the last six years. Sanitary work in the borough seems to be well sustained, but we should like to see a more efficient infectious hospital established.

TAUNTON URBAN AND RURAL.—In the area of the Taunton Union the chief epidemic of the year 1878 was measles, which destroyed 13 lives in the rural district, and 25 in the borough. No other infectious disease was particularly prevalent, though diarrhœa caused 16 deaths in the borough. The death-rates were 15.4 (rural), and 21.8 (urban). One fourth of the deaths in the former, and one third in the latter were in children under five years, whilst in both districts nearly half the deaths were those of persons above the age of 60. Diseases of the respiratory organs were very fatal, causing altogether 179 deaths within the area. Generally the health of both districts compares favourably with past years, and zymotic diseases are declining. An important step has been taken in the erection of a very complete infectious hospital of 24 beds for the joint use of both districts. The sewage works for the borough are favourably spoken of, though the ventilation of the sewers requires attention. The process at the works (which is merely precipitation and clarification) has been made much less costly (without any loss of efficiency) by substituting common salt for magnesium chloride.

TENDRING RURAL.—Dr. Cook's report for 1878 is practical and concise. He tells us that the water-supply, which is procured from wells, is in many instances very deficient; that the drainage, especially in the larger villages, is defective, and that the cottage accommodation is very limited, a large proportion having only one bed-room. There are no bye-laws for the district, except for the rising watering place of Clacton-on-Sea. During the year, 362 deaths occurred, equal to a rate of 16.71 per 1,000. Zymotic diseases caused 53 deaths; scarlatina, which, as well as measles, was prevalent in most parts of the district, being responsible for 3 deaths, measles for 5, and whooping-cough for 13. 'Fever' caused 8 deaths, 15 cases of it occurring at Little Clacton, and others at four other villages. Dr. Cook's advice as to the separation of any hospital accommodation from all connection with the workhouse seems to us worthy of strong support.

WREXHAM RURAL.—The reports of the two medical officers of health for this district, Messrs. Davies and Jones, are brief, and do not call for much comment. In Dr. Davies' district the death-rate was 21.3, and in Mr. Jones' district 19.34 per 1000. Both divisions suffered terribly from scarlatina, a total of 45 deaths being registered from this cause alone. Typhoid fever was also prevalent during 1878, and caused 10 deaths in Mr. Davies' division. The water-supply of the district seems to be fair, but nuisances of various sorts appear to be rife, as, considering the mortality from typhoid fever, might have been expected.

LAW REPORTS.

THE COST OF AN ANALYSIS.

Richard Young, chemist, Liskeard, brought an action against Daniel Bray, farmer, Altarnun, at the Liskeard County Court, to recover two guineas, the cost of an analysis. Mr. Childs stated that some time since defendant came to plaintiff, and said that certain cattle in his charge had died, and, having described the symptoms of death, Mr. Young gave it as his opinion that it had resulted from some kind of irritant poison. The result was that Mr. Bray sent one of his drenches to Mr. Young to be analysed. It was found that the drenches were poisonous, and would destroy cows or any other cattle taking them. Plaintiff told him that if he took the analysis the fee would be two guineas. Bray accepted the analysis, and Mr. Young entered him in his book as a debtor for the sum now claimed.—Plaintiff stated that when the bargain was made he was so certain that the drench contained poison that he offered, if such were not the case, to pay the expenses. The analysis was made in London, and witness obtained 20 per cent. discount for his trouble. Defendant accepted the analysis. The poisonous drenches were sold by a man named Humphries, trading in Liskeard as a chemist! Defendant returned to witness, and said he had taken legal advice, and Mr. Peter, of Launceston, said the analysis did not show the presence of poison.—His Honour, looking at the analysis, said it stated that the drench contained only nitrate of potash and starch; it did not state the quantities, and did not, therefore, prove the presence of poison. Had defendant been advised to bring an action against Mr. Humphries on that analysis it would have entirely broken down. His own opinion was that the analysis did not on the face of it show there were any poisons or noxious matters present in suffi-

cient quantities in the drench to be poisonous. If a person took one grain of nitrate of potash it was not poisonous; but if an ounce were taken it might do some harm. There was nothing in the analysis to show the quantity of potash in the drench, and plaintiff under these circumstances had undertaken to pay for it. A verdict was, therefore given for the defendant.

BAKING POWDER.

An action has been before the Cambridge magistrates, instituted by the market committee of the Corporation of Cambridge, against Messrs. Smith and Sons, of Norwich, for selling baking powder which, by being mixed with flour, it was alleged, became an adulterated article of food. The summons was taken out against Messrs. Warren and Sons, grocers, Cambridge, as the agents of Messrs. Smith. Mr. Cockerell appeared for the prosecution, and called Mr. Knights, the public analyst at Cambridge, Mr. Muir, of Caius College, Dr. Anningson, and Dr. Bradbury, to prove that the powder contained ingredients which affected the health; and that, therefore, to make bread with the powder would be injurious. Mr. Bloefield, for the defendant, called Mr. Sutton, the public analyst for Norfolk, and also Dr. Beverley, who stated that in their opinion the powder did not contain anything that was injurious to health. The Bench inflicted a fine of 40s. Notice of appeal was given.

BABY-FARMING.

Elizabeth Dyer, a woman in whose care several illegitimate children had died, was charged before the county magistrates at Long Ashton, near Bristol, with receiving children to nurse in a house unregistered, contrary to the provisions of the Act for the Better Protection of Infant Life. The prisoner pleaded 'Guilty', but said she was not aware that she was required by law to have her house registered. Formal evidence having been given, she was sentenced to six months' hard labour, the full term specified in the Act.

JERRY BUILDING.

At the Petty Sessions, Edmonton, an adjourned case came on, when Charles Browne, builder, of Edmonton, was charged on eight summonses with constructing the brickwork of certain houses in South Street, Upper Edmonton, not properly bonded and solidly put together with mortar or cement, in contravention of the bye-laws of the Edmonton Local Board of Health. Mr. Robert Harrison, assistant surveyor to the Edmonton Local Board, deposed that his especial duty was to look after new buildings, and in the course of his rounds he viewed some new houses on the Langhedge estate built by the defendant, saw some stuff in a heap, but had no idea of its being used in the building until he saw a man fill a hod with it, take it up a ladder, and commence using it. He went up the ladder and saw nearly all the hod-load used, then took the sample produced. A few days afterwards he went again, and took a sample from the back additions to each of eight houses, and produced the samples. He considered the whole eight samples bad, and that none of the material ought to have been used. In cross-examination he defined the mortar as a substance consisting of two-thirds sand and one-third lime. It was not necessary to have those proportions for mortar to bind, but it was to ensure strength and keep the wet out. Mud might bind together, but it would not last; it would remain solid until the wet got in, but no amount of lime mixed with mud would make mortar to prevent the wet from penetrating.—John Harrison, surveyor to the Edmonton Local Board, deposed that he had seen the samples, and his idea was that they were not mortar. Mortar ought to be made from sand and lime. Mould was not a fit substance to mix with lime, and the samples produced were not mortar or cement as intended by the bye-laws. They consisted of mould and lime, and would probably go to powder and fall out by the action of frost. Mould contained the elements of vegetation, and therefore ought not to be used for building purposes. In cross-examination he said that well-ground bricks would not supply the place of sand in mortar, because it would not give the necessary sharpness. The Justices adjourned their decision until they had inspected the buildings, and having done that, said the two summonses as to two houses which had not back additions would be dismissed, and on the other six summonses they would inflict a penalty of £1 a house, with costs.

METROPOLIS LOCAL MANAGEMENT ACT (SEC. 81).

Mr. Brickell, a builder, was summoned by the Fulham Board of Works for erecting a new house, 17, Pownall Terrace, Fulham, without sufficient apparatus for a water supply and an ashpit. This was the first case of the kind which had been brought under the notice of the Court. Mr. Faiman, in support of the summons, said it was taken out under the 81st section of the Metropolis Local Management Act, the defendant being liable to a penalty of £20. It appeared from the evidence that the house, which had recently been finished, was now occupied and was without any water supply. Mr. Bridge said this was in direct disobedience of the Act, and might have caused disease. He imposed a penalty of 40s., and 2s. costs.

PAYMENT FOR IMPURE GAS.

The Gas Company at Berkhampstead have deferred to a decision given by Judge Whigham at the Chesham County Court, in a claim made against Mr. Ezra Miller for the recovery of their account for gas supplied during the two winter quarters of Christmas and Lady-day last. The company's gas-making got into a great muddle under new administration, and the officials sought to compel payment for the sulphuric compound called gas supplied the same as for good gas, and the defendant on principle determined to contest the claim. The ex-chairman of the company, Mr. J. E. Lane, was also sued for a similar claim, and he determined to resist payment, and a reduction of 25 per cent. was demanded in each case, and the balance was paid into court as sufficient for the article supplied. The evidence adduced by the defendants at the court satisfied the judge that the gas was badly made, was of bad quality, and the amount tendered for it, 3s. 9d. per 1,000 cubic feet, was ample, and judgment for the defendant was given with costs, with liberty for the plaintiff company to have a case for the Superior Court. The case against Mr. Lane was adjourned till the next meeting; but previous to the court-day, Mr. Lane's solicitor was informed that the company, abiding by the decision of the court in Mr. Miller's case, had withdrawn the case against Mr. Lane, thereby ad-

mitting the principle of a 25 per cent. reduction. Many of the gas consumers paid their accounts for the two quarters in dispute under protest, consequently it now remains for them to claim a return of their money to the extent of one-fourth, and many other consumers, who paid their accounts without actual protest, but with a fear of being proceeded against, will consider themselves unfairly dealt with unless they also receive a like reduction. The expenses allowed by the court in Mr. Miller's case amounted to £6 10s.

THE PUBLIC HEALTH (WATER) ACT, 1878.

The Runcorn Rural Sanitary Authority, represented by Mr. Farrington, sanitary inspector, who had refused to grant to Mr. Stanhope Bull, county surveyor, a certificate that there was provided within a reasonable distance of the dwelling-house and lockups recently erected by the county, at Frodsham, such an available supply of wholesome water as was sufficient for the consumption and use for domestic purposes of the inmates of the said dwelling-house and lockups, were summoned to show cause why an order should not be made authorising the occupation of the building, notwithstanding the refusal of the said certificate.—Mr. Bull explained to the Magistrates that a new police-station had been erected at Frodsham, and the water in the new well had been analysed by the county analyst, who gave the following certificate:—'A very bad drinking water. It has a very large amount of solid matter, and also the chlorine unusually high. It is what I should call a brackish water, being very salt, as if sea water had been mixed with it.' In consequence of this certificate the Rural Sanitary Authority of the Runcorn Union had refused to grant a certificate authorising the occupation of the house under the Public Health (Water) Act, 1878, and he now applied under the 6th section of the Act for a certificate from the magistrates authorising the occupation of the building.—The Bench granted the certificate applied for, on condition that the police authorities saw that the water was not used for culinary purposes, and that the house was supplied from one of the public sources until a proper supply was provided.

The Rev. J. D. Havard, Vicar of Helsby, was summoned by the Rural Sanitary Authority of the Runcorn Union, for occupying the new vicarage at Helsby without having first obtained a certificate of the provision of a sufficient available supply of wholesome water within a reasonable distance of the house.—Mr. Farrington, inspector to the Sanitary Authority, stated that on the 19th of June he furnished the Rev. Mr. Havard with an abstract of the Public Health (Water) Act, 1878, showing its requirements with regard to the occupation of new buildings. On the 18th of July he found the house occupied, and no certificate had been obtained. Mr. Havard had refused to pay the cost of having the water analysed, and consequently the Authority did not submit a sample to the analyst.—Mr. Havard said that when Mr. Farrington told him verbally that before the house could be occupied the water must be analysed, he (the speaker) said he should protest against paying the expense under the circumstances, because the situation of the well made it impossible for anything to be wrong with it. There was nothing above it except the hill, and nothing on the side of it that could possibly go into it; and, moreover, the drainage of the house was such that it went in a totally different direction. The well was not ready when he occupied the house, and it was not now ready for analysis, both it and the house being still in the hands of the contractor. Ever since he had been in the house he had had an abundant supply of rain water for all purposes.—Mr. Farrington said he did not doubt what Mr. Havard said about the supply of rain water, but the Authority would not grant a certificate until they got to know the component parts of the water.—The magistrates were of opinion that they had no option in the matter but to convict, and the fine inflicted was 1s. and costs. The offence clearly was that of occupying the house without first obtaining a certificate. Mr. Havard could now ask the Sanitary Authority for a certificate, and if they refused to grant one, he could then come to the magistrates, as Mr. Bull had come in the preceding case.

MILK ADULTERATION.—HEAVY FINE.

Robert Rowsell, a milkman, of Bath, was summoned under the Sale of Food and Drugs Act, 1875, for selling to Inspector Montagu a quantity of milk which was adulterated and not of the quality demanded. Mr. Moger, clerk to the Urban Sanitary Authority, said that Mr. Montagu called at a shop kept by the defendant, who was a dealer in milk, and asked for a pint of new milk, which was supplied by the defendant, to whom he handed 1½d. in payment. This was the ordinary price of new milk. Mr. Montagu complied with the provisions of the Statute by informing defendant that he had purchased the milk for the purpose of having it analysed by the Borough Analyst, and offering to divide it into three parts. The offer was accepted by the defendant, and Mr. Montagu then and there divided the milk. The defendant retained one part, Mr. Montagu took the second part direct to Mr. Gatehouse the analyst, and the third part he would produce. The analyst gave a certificate as to the composition of the milk, by which it appeared that it contained 15 per cent. of added water. The certificate came before the Committee, and he was instructed to prosecute the defendant, and to ask for such a penalty upon the seller as under the circumstances seemed right. The Bench had power to inflict a penalty of £20 or a less amount. There was no peculiarity in the case, but it was one in which he felt compelled to ask for a severe penalty, because the neighbourhood in which it occurred was one in which poor people purchased milk to a considerable extent, and they required protection vastly more than people who could afford to get milk where they liked. This was not a case in which it could be urged that the keep of the cow could enter into any calculation as to the milk, because it contained water which had been actually added. Defendant informed the Bench that his wife was in the habit of taking out milk, and on the morning upon which the inspector called she obtained a quantity from a dealer. The last few drops of this milk he sold to the inspector. The defendant said he had no warranty from the persons he had it from, and the Magistrate's clerk told him, that in the absence of a warranty he was the person responsible. The Bench fined the defendant £10 and costs, or fourteen days' imprisonment. With respect to the defence which had been set up, that defendant had purchased the milk from another dealer, if true, he had his remedy in the County Court. Defendant went to prison.

LIABILITY OF A LANDLORD FOR OVERCROWDING.

A case which involved this question was recently before the bench of the Gloucester Petty Sessions district, before whom J. Hayward, the owner of a house at Sandhurst, near Gloucester, was summoned by the Gloucester Rural Sanitary Authority for allowing overcrowding in the said house. The sanitary authority were represented by their clerk, Mr. L. G. H. Mayer, and by Dr. Bond, medical officer of health for the district. The facts of the case were not disputed, but the bench at the first hearing having expressed a doubt whether a landlord could be held liable for such an offence, adjourned it, in order that evidence and precedent might be obtained on the point. At the second hearing, the liability of the landlord was maintained on the following grounds: that the 94th clause of the Public Health Act provided that the local authority shall serve notice of abatement 'on the person by whose act, default, or sufferance the nuisance arises or continues'; that a landlord who is cognisant of overcrowding on his premises, and who has the power of abating it, by giving his tenant notice to quit, and who refuses or neglects to do so, must be looked on as an accomplice after the fact, and as 'suffering the nuisance to continue'; lastly, that although it might be proper that the notice should be served on the tenant, as the person 'committing' the nuisance, in most cases there were others, of which in the opinion of the prosecutors this was one, in which it was expedient to deal with the landlord instead, and that the latitude of expression in the Act referred to above clearly left it to the discretion of the sanitary authority to select which of the two they would attack, or whether they could attack both. It was further shown that, in an opinion which had been obtained from Mr. Lumley, Q.C., on this point, that learned gentleman had advised that a landlord could be held liable under such circumstances; also that the Hardingstone Rural Sanitary Authority had actually obtained a conviction against the Marquis of Northampton in such a case; and that in a similar case the Scotch Court of Appeal had held (Horne v. Kelso Local Authority) that under such circumstances a landlord was liable under the Public Health Act of Scotland, the provisions of which in regard to this form of nuisance were practically identical with those of the English Act. The bench, however, whilst not denying that they might have the power to make the order asked for, declined to do so, the chairman (Sir W. Guise) stating that the question was too important a one for them to take the responsibility of deciding, but cautioning the defendant that he had better get rid of his tenants or they might have to deal with him hereafter. Unfortunately, as no penalty or order was made, there was no possibility of carrying this case to a higher court, and so this important point remains still undecided, so far as the decision of an English Court of Appeal is concerned.

POLLUTION OF THE RIVER THAMES.

At the Bucks Petty Sessions at High Wycombe, three firms of paper or millboard manufacturers having mills on the river Wick, which runs into the Thames near Cookham, were summoned by the Thames Conservancy for having suffered to flow into the stream offensive or injurious matter, contrary to the provisions of the Thames Conservancy Act, 1866 (29 and 30 Vic., cap. 89). The first case heard was that of Messrs. Thomas and William Lunnon, of Hedsor Mills. Mr. Payne, who prosecuted, said the officers of the Conservancy had from time to time taken samples of water from the defendants' mill. As they found it grew worse they had ordered these proceedings. Captain Etheridge, an officer in the service of the Conservators, and Mr. G. W. Wigner, analytical chemist, were called. The former proved visiting Hedsor Mills on the 28th of May last, and obtaining a sample of water from the mill-head, and also a sample of the effluent which passed into the stream from the process of millboard-making. This effluent Captain Etheridge admitted, in cross-examination, was very small in quantity, dripping from the millboard under pressure into a small gutter. It took him three-quarters of an hour to catch a pint and a half in a bowl. Mr. Lunnon informed him that he used no chemicals in his manufacture. Mr. Wigner gave the result of his analyses of the head water and effluent water from Hedsor Mill. The former he characterized as very impure, but not absolutely to be condemned; but the effluent water was utterly unfit to go into a river, being so contaminated by chemical and other pollution that it could not by any treatment be purified. For the defence, Mr. Rawson urged that there was no case under subsection 2 of the 63rd section of the Act, because it applied to pipes, drains, etc., not in use at the passing of this Act. The next case was against Messrs. Grosvenor, Chater, and Co., of Glory Mills, Wooburn, a little further up the stream. Mr. Chater appeared, and pleaded 'Guilty', but he complained that the Conservancy had not acted quite fairly in the matter. Thirteen years ago they served him with a notice, in compliance with which he made various alterations in the filtration of his effluent water. They had constantly inspected his premises ever since, and now prosecuted him without the slightest warning. In the case of Messrs. T. H. Saunders and Co., of Beech Mill, near High Wycombe, Mr. D. Clarke appeared for the defendants, and pleaded 'Not Guilty'. Mr. Payne, in opening, said he should rest this case upon disobedience to a notice served some years ago, and he called an official from the Conservancy Office, who produced a duplicate of the notice. This was objected to by Mr. Clarke as insufficient proof of service, and the Bench upholding the objection, this case was dismissed. The other summonses were adjourned for three months, in order to allow an opportunity of abating the evil.

REVIEW.

Children's Lives, and How to Protect them. By W. LOMAS, M.D. London: Sampson Low and Co. 1879.

THIS little book is an altogether welcome contribution to the literature of preventive medicine. Though it contains but little that is new, it is marked throughout by sound common sense, and is clearly the production of no mere compiler, but of one who has thoroughly assimilated his knowledge of the subject which he treats so lucidly and practically. The earlier chapters of the book are devoted to the matter of rearing the young infant; and here the author not only gives directions, but, what is especially valuable, shows how they should be carried out. Witness his account of the preparation of lime-water.

We entirely endorse the plan of feeding recom-

mended in chapters vi and vii, and would invite the perusal not only by mothers, for whom this book seems chiefly intended, but also by doctors, to whom it will be of no little use, of the paragraphs relating to the dosing of babies for such maladies as diarrhœa, without due inquiry into the cause. For proper care in the choice and preparation of the food is in most cases all that is necessary. Mention might have been made in this part of the book of the alternative plan of feeding quite young infants who cannot digest milk in any form, on veal or chicken broth. Cases of this kind occasionally occur where serious wasting and symptoms of faulty digestion give way rapidly to a temporary course of this treatment. Omissions, however, of any importance are by no means a feature of this book. The remarks on gum-lancing are practically sound.

In chapter x we have clear and admirable directions as to the ventilation of the nursery, the mode of clothing, and other accessories to the health of young children, all of which are well worthy of attention.

Chapters xi to xxiii discuss the chief maladies incidental to childhood, and are generally in accordance with the most recent knowledge of the subject. Especial notice is called to the fact of the greater richness in butter of goat's than of cow's milk, and the consequent advantage of the former to weakly children of more than a year old. On the other hand, the author reminds us of the use of asses' milk, which, being less rich in butter and cheese than woman's milk, is suitable to some cases of delicate babies who have been prematurely weaned.

Very valuable remarks are made in chap. xii on the nervous impressionability of childhood, and the necessity, in consequence, of avoiding and warding off causes of excitement, which often lead to physical derangement, in the form, among others, of feverish attacks. An interesting illustration of this we may quote from experience in children's hospitals where temperatures are taken regularly, the day of admission, visiting days, and other exciting events being fairly well registered by a heightened figure on the chart.

With regard to the subject of bowel disturbances in childhood, we have, among other sensible remarks, the excellent dictum 'that a good nurse seldom fails to train a child's bowels into regular action'. Here, as elsewhere, we see with pleasure the urgent enforcement of the rational or scientific treatment of maladies by an inquiry into their probable cause, the removal of which, when found, is often so easy in the case of children, and the much-needed discouragement of the offhand drug-treatment of mere symptoms, which is boasted of by so many parents, and supported by the domestic (and not always homœopathic) medicine-chest.

There is much truth in what the author says about the bad effects of mental overwork, in the cases both of precocious and dull children; and though we scarcely agree in believing that this evil is of a very great extent, examples undoubtedly occur sufficiently often, especially in this time of compulsory education, to justify the consideration of the subject by those who have the care of children's studies. That chorea may be excited by too close work at school is tolerably certain, and there is good reason to ascribe some cases of epilepsy to similar causes.

We have not space to notice at any length the latter part of the book, which deals with the prevention and, to some extent, with the treatment, of the so-called infectious diseases of childhood. All that is said is to the point, and eminently useful. Although there may be some doubt as to the absolute certainty spoken to by the author of the conveyance of diphtheria by kissing, there can scarcely be any as to the too generally forgotten likelihood, suggestively noted in chapter xviii, of the carrying of the germs of scarlet fever or measles from one room to another by domestic animals, such as cats and dogs.

The whole of the detailed precautions against the spread of infectious diseases, and the instructions as to disinfection are of much value, and contribute to make this book worthy of a cordial recommendation to all readers.

LEGAL NOTES AND QUERIES.

LEGAL AUTHORISATION OF SANITARY PROCEEDINGS.

I shall be much obliged if you will kindly give me, in the *Sanitary Record*, your opinion upon the following matter:—The Saltley Local Board a short time ago proceeded against a firm for nuisance caused by smoke, but failed to obtain a conviction, in consequence of the Inspector of Nuisances not being able to produce the Board's minute book and also the minute book of the Sanitary Committee, the magistrates holding that no other evidence was sufficient to prove—1st, the Inspector's appointment by the Board; 2nd, the authority given by the Board to the Sanitary Committee to institute legal proceedings; and 3rd, the authority given by the Sanitary Committee to the Inspector to take these particular proceedings. I should say the Inspector produced a certificate, signed by myself as clerk, as to his appointment, and also, under the seal of the Board, a copy of the minute giving the authority to the Sanitary Committee to institute legal proceedings in all cases of nuisances; but it was held that the minute books could alone be given as evidence. The effect will be that in all future proceedings we shall have to produce these minute books to prove our case, which appears on the face of it absurd. Will you kindly say if you know of any case bearing upon the question.—Yours faithfully,

DIGBY JENKINS,
Clerk, Saltley Urban Sanitary Authority.

[The appearance in Court of a Sanitary Authority is governed by the words of the Public Health Act, 1875, sec. 259, which provides that 'Any local authority may appear before any Court or in any legal proceeding by their clerk, or by any officer or member authorised generally or in respect of any special proceeding by resolution of such authority, and the clerk or any member so authorised shall be at liberty to institute and carry on any proceeding which the local authority is authorised to institute and carry on under this Act'. So far as we can judge, the magistrates in this case acted rightly in requiring formal proof that the Inspector of Nuisances had been authorised by the Board to institute the proceedings, and to appear in Court. See Cheetham *v.* Manchester (ap. 32 L.T. 32, and the Isle of Wight Ferry Co. *v.* The Ryde Commissioners, 25 J.P. 454.—ED.]

The President of the Institute of Chemistry offers two prizes of £50 each for the best two original investigations involving gas analysis.

A DICTIONARY OF SANITARY APPLIANCES.

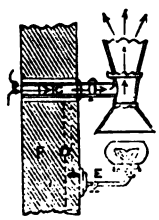
BY W. EASSIE, C.E.

(*Continued from p.* 162.)

AIR.—XXVIII.

OUTLETS FOR THE PRODUCTS OF GAS COMBUSTION (*continued*).—The idea of fitting up gas-burners, with tubes leading to a general abstraction shaft, has now become very general; and if the sectional area of the latter be properly apportioned to the tubes coming from the burner, good work will be done. Experiments made by Dr. Bartlett some time ago, with gas brackets, connected to a general shaft by branching tubes over the burners, proved that, under certain circumstances, only some of the globes over the burners can, however, be said to be ventilated by these tubes; and it appeared that the globes nearest the withdrawing flue are alone benefited. To properly ventilate the burners, a tube should be led from each globe, separately, to the general upcast tube. And it has been further remarked by him, that the sectional area of the general withdrawal shaft should somewhat exceed the total sectional area of the tubes leading from the burners. Other experiments, made by Dr. Drysdale of Liverpool, satisfied him that foul air of any kind, the products of gas combustion included, should be separately led first of all to a collecting chamber, and that the upcast shaft should exhaust from that.

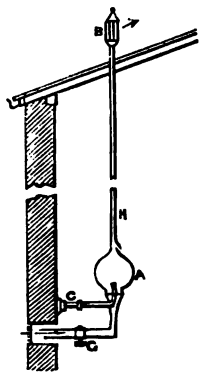
Dr. Francis T. Bond of Gloucester introduced, in 1877, what he terms the 'Euthermic' Ventilating Gas Bracket, by which he claims to effect a simple means of introducing a current of fresh air into the room, and also of warming such air. He also, by its use, prevents the undue pollution of the atmosphere by the products of combustion, inasmuch as the stream of heated air from the burner is compelled to mix with a continuous current of fresh cold air from the outside, which cools and dilutes it. The appliance consists of a hollow cone, open at both ends; and to the lower end of the cone is attached a glass hot-air collector. The fresh air inlet tube is fixed at right angles to the cone, and slides telescopically into a larger tube, previously fixed in the wall. This dumb-bell shaped cone thus acts as an inlet, and when it is placed above a gas bracket, and light is applied to the latter, a current of air is supplied through the wall tube, to compensate for that used by the burner. The bracket will thus act as a constant ventilator to a room, and should the wind be boisterous outside, the excess inward current can be checked by means of a valve, placed between the cone and the inner surface of the wall.



Dr. Bond's Euthermic Ventilating Bracket. F, wall; C, inlet tube; E, gas burner.

Such a contrivance as I have described is calculated to perform some useful work, as it not only provides a necessary supply of air to support the light, but dilutes the products of the combustion. It is a material advantage of this bracket, that it serves equally well as an inlet for fresh air when the gaslight is not required; and in the daytime also, by keeping a small jet of gas alight, the incoming air can be slightly warmed. The only drawback to its use is the necessary admixture of the air with the products of combustion; but this could be reduced to a minimum in most cases, and were it placed high enough in a room, with a sufficient outlet accommodation, no harm could ensue. It is adapted for use in all cases where it would be difficult to lead a special tube from a burner, and its economy is self-evident.

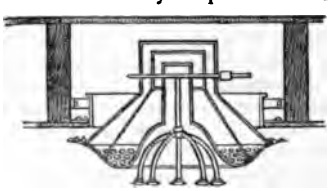
In the cases of conservatories attached to rooms, when it is inexpedient to fit up hot-water piping, in order to heat the air, the heating gas globe of Mr. Buchan will be found advantageous. This contrivance heats by simple radiation, and at the same time prevents the products of the gas combustion from contaminating the air of the conservatory. It consists of a large glass globe, twelve inches, or so, in diameter, contracted at the top to two and a-half inches, and about four inches wide at the base. The gas bracket is led to the interior of the globe, and from the top of the globe a ventilating pipe is carried up to the outer air—a plain exhaust cowl being fitted at the extremity. An inlet of air is not absolutely essential, but if found so it is placed underneath the globe. This gas globe is placed near the floor line, and furnishes both light and heat. The inlet pipe can also be so set as to supply fresh air to the conservatory, the chill being taken off as it comes into contact with the exterior of the warm globe.



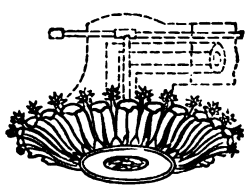
Buchan's Conservatory Gas Heater. A, globe; C, gas bracket; H, outer tube, with cowl at B; G, inlet with valve.

Outlets by means of Sun-burners.—This system of combined lighting and ventilating was first introduced by Mr. A. King, the Engineer of the Gas Works, at Liverpool, and was intended to remedy the evils consequent upon the vitiation of the air by gas burning in large quantities, when brilliant illumination was necessary. Their use is now almost universal in large rooms; and where the height from floor to ceiling is sufficient—with certain precautions—no better system of lighting can be found.

There are very simple forms of sun-burners, for use in moderately sized rooms, about which little need be said. In each case the heated air is carried off by ventilating shafts, placed at the top of the burner. They are variously constructed, but the essential lies in the due withdrawal of the products of combustion to the outer air, or to the flue of a chimney. These flues must necessarily be of a fireproof character, as the imparted heat is very great, and consequently dangerous. For smaller sized rooms, a very compact form will be found in the box-top sun-burner, manufactured in London.



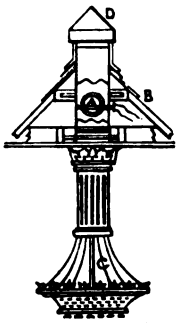
Ordinary Sun-burner fixed between joists.



The Box-top Sun-burner of galvanized iron.

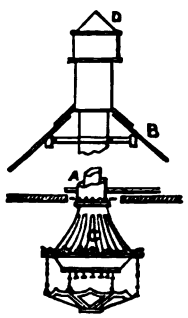
The sun-burner order of lighter and ventilator is now manufactured by many firms, and the general character is essentially the same, the chief thing sought for being the total withdrawal of the products

of combustion, and the avoidance of down-draught. The liability to the latter is not very easy to overcome; and, as a rule, the upcast is fitted with some kind of a throttle valve, which is in communication with a cord leading to the wall below. There were originally several drawbacks to the use of sun-burners, and one of them lay in the very objectionable shadow which was thrown upon the ceiling. To remedy this, Mr. J. Mackenzie, Manager to Messrs. Strode and Co., Gas Engineers, of London, conceived the idea of fitting in the sides of the internal cone, as well as the sides of the ventilating funnel with some transparent material, which, whilst resisting the heat generated by the fierce burners underneath, would not intercept the passage of light. He eventually adopted sheets of talc for this purpose—a practice which is now followed by nearly all makers. This altogether avoids the dark shadow on the ceiling, which was more or less extended, according to the distance the burner projected below the soffit of the ceiling.



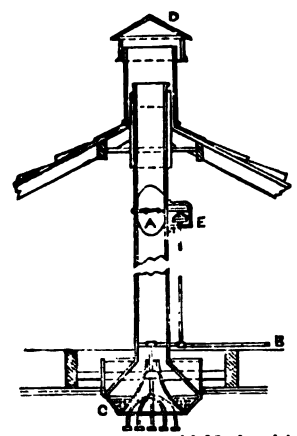
Hodge's Ventilating Sun-light. C, talc covering; B, stay; A, throttle-valve; D, wind cover.

There have been many improvements in the sun-burning order of lights since their first introduction; but the chief of them relates to the removal of the shadow already mentioned, and to the assistance in ventilating a room, which their use afforded. In some cases the outlet shaft is fitted with a throttle valve; a double shaft being made use of with advantage. Sometimes, also, an embossed glass screen is suspended beneath the sun-burner, in order to remove the naked appearance of the lights. As a matter of course, these sun-burners can be provided with any amount of ornament.

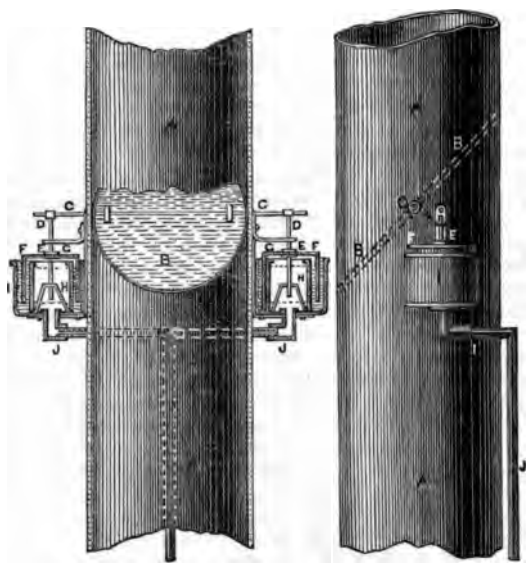


Hinlett's Sun-burner with glass screen under. A, ventilating shaft; B, stay; C, double talc cone; D, wind guard

In all sun-burners there is necessarily provided an exit shaft, for the removal of the products of combustion, and the vitiated air of the apartment; but when the burners are not lighted up, there is a liability to a downward current, which is very objectionable in many ways. To obviate this, Mr. J. Mackenzie invented, in 1859, a means of closing the exit passage in the shaft, by the adoption of a valve, which opens by the pressure of gas flowing to the burner, and closes upon the pressure being withdrawn or cut off. This very ingenious arrangement is still in use. When the gas is turned on, it flows through the pipe to the burners below, but at the same time flows into a compound vessel placed beside the shaft, the concentric cylinders of which are filled with quicksilver, and the pressure of the gas raises certain rods, whereby the throttle valve, situated in the shaft, is opened. When the gas is cut



Strode's Sun-burner, with Mackenzie's self-acting valve. C, sun-burner; D, wind guard; A, throttle-valve; E, self-acting valve apparatus.



Mackenzie's Self-Operating Ventilating Valve for Sun-burners, etc. A, shaft from sun-burner; B, valve; C, spindle; D D, levers on same attached at one end to spindle D, and at the connecting rods E E; G H, guides attached to upper vessels F F; I I, lower vessels containing mercury; J, gas-supply pipe to apparatus, taken from main supply to gas-burner.

off, the upper portion of the vessel descends, drawing the connecting rod with it, thereby closing the valve, and effectually preventing any downward current into the room. This contrivance may be described simply as an inverted vessel, floating in mercury, acted upon by the pressure of gas in the supply-pipe.

The latest improvement in that system of ventilating buildings, wherein a sun-burner, or grouped gas lights, are placed near the ceiling, in order to yield light, and are at the same time employed for heating air in a cylinder, fixed within the vertical withdrawing shaft, so as to create an upcurrent, was brought out in 1878, by Mr. W. Fisher of Manchester. It had, hitherto, been customary to leave the top of the inner or hot-air tube open, so that the hot air and direct products of combustion did not mingle with the vitiated air from the rooms in the ventilating shaft, until it arrived at the upper end of the hot-air tube, placed some distance above the roof of the building. Mr. Fisher's improvement, which is very highly

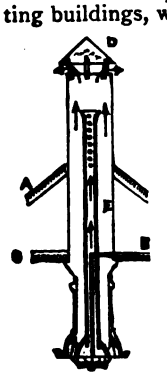


FIG. 1.

FIG. 3.

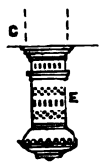


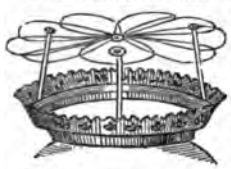
FIG. 2.

Fig. 1.—Vertical section of Fisher's Ventilating Sun-burner. A, roof; E, outer ventilating shaft, with perforated hot air tube inside; B, gas-supply; C, ceiling line; D, wind guard.
Fig. 2.—Outside elevation, showing perforations.
Fig. 3.—Plan, as seen from underneath.

recommended by those who have used it, consists chiefly in closing the top of the inner or hot-air tube, and in perforating the sides of this tube all round, above the ceiling line, in order to compel the hot-air and the products of combustion to pass at once into the outer ventilating shaft. By this means an upward current is created below the perforations, the effect of which is to compel the vitiated air to ascend, and pass out with the ordinary products of combustion.

The sun-burner was originally designed for the illumination of large rooms, such as public halls and theatres; but if a proper pattern be chosen, there is no reason why it should be excluded from dwelling-houses. The number of the burners must, however, in this case, be fittingly calculated, and the flue led preferably to the chimney shaft, care being taken that the horizontal portion which runs between the joists is constructed of galvanised iron, covered with non-conducting cement—and as much isolated from the woodwork as possible. There are innumerable methods of ornamenting the shaft and body of the sun-burners; and glass pendants can be made to depend underneath in every variety of shape. The main thing is to see that the room is sufficiently lofty, and that the ventilation is constant and effectual.

The remarks which have been made upon the necessity for the removal of the products of gas combustion and the description of the schemes introduced to effect this with success, will go far to show that sanitarians are on the alert in regard to the elimination of this factor of air pollution. Nevertheless, it cannot be sufficiently impressed upon the consumers of coal gas that, when no special means of removal of the carbonic acid exists, some little amelioration can be produced by due attention to the outlets in a room. The measure of impurity of the air in the room can also be somewhat decreased by the affixment of calottes or caps of mica, glass, or terra-cotta. By the use of these the gas is more fully consumed, and does not so much escape in the form of unconsumed carbon.

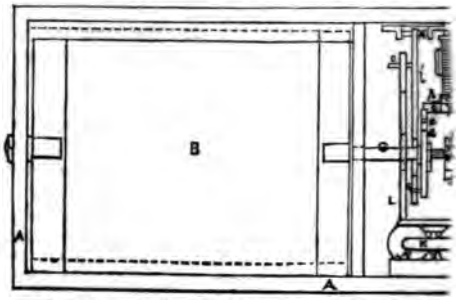


Gas globe coronet with mica calotte.

Gas globe coronet, with calotte of opalesque glass.

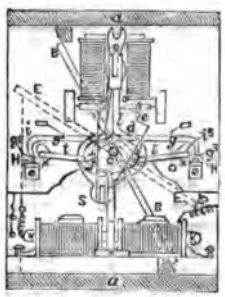
Automatic ventilating outlets.—An example of this is afforded by the apparatus designed by Messrs. Symonds of Potton, Bedford, in 1878, and deserves a full description, owing to its ingenuity and adaptability to most purposes. These ventilators are so constructed as to open and shut in a self-acting manner, being governed by a thermometer, in electrical connection with a small battery, which can be placed anywhere in the building. When the maximum temperature, say 60° is reached, the ventilating louvre board opens, allowing the heated air to escape; and the internal air being thus cooled, the mercury in the thermometer descends, and when it falls, say to 58°, the ventilating louvre closes. The ventilator is also locked by the action, and is only influenced by a sufficient variation of temperature.

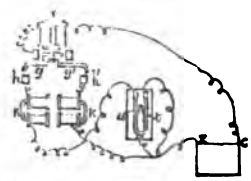
Messrs. Symonds employ a louvre board or plate pivotted in a frame, and when in its normal position it occupies an angle of 45°. One of the pivots of the louvre extends through the frame and passes through a metal plate, the upper periphery of the plate being provided with two notches for the purpose of locking the ventilator. Either behind or in front of th is put a disc of non-conducting material on the same pivot as the larger disc, the small forming—with or without its springs—a contact



Elevation of a Symond's Patent Automatic Ventilato A, frame, with louvre board B fitted in same; C, louvre r L, l, rods; K, opening and shutting magnets, with lock magn

and breaker. On the upper portion of the pe of the contact disc is a plate of metal connect one of the poles of a battery, and the discs a nected by means of a cranked connecting r the armature of a number of electro-magn ranged in pairs—one set of magnets bei opening the ventilator, and the other set for Above the larger disc is a pivotted armatu vided with a catch for taking into the not the disc, and above this armature is placed a





K, K, opening and shutting magnets; U, minimum tube of the thermometer A; l, maximum tube; h and h', contact blocks; g, g', rods; C, battery.

Section of Symond's Automatic Ventilator. B, louvre when closed; E, louvre when open; a, frame; K, K, electro-magnets, with lock-magnet above.

electro-magnets, connected with and operating simultaneously with the opening and closing electro-magnets. Messrs. Symonds employ an ordinary maximum and minimum electric thermometer, connected with the battery and the electro-magnets.

By this arrangement and construction of apparatus it will be understood that, the louvre being closed, if the temperature rises the mercury in the maximum tube rising will make contact with the wire therein and will complete the circuit, thereby causing one set of the electro-magnets to attract the armature and operate the connecting rods. At the same time the lock magnets will attract the pivotted armature, the tooth of which will be released from its catch, and the disc will be allowed to partly rotate, moving with it the louvre. At the completion of the stroke the circuit is broken and the magnets cease to act, and the locking armature falls into a notch in the disc and keeps the ventilator open. On the temperature falling, and contact being made between the mercury and the wire in the minimum tube, the circuit is again completed, and the opposite pairs of magnets being put in action, the reverse movement

takes place, and the ventilator is closed and locked in that position.

There can be no doubt that an automatic system of ventilation of this kind is much wanted, and that the apparatus thus described will prove useful in many cases, provided that the louvres are not made too long. They work very well, apparently, up to six feet in length, which would be sufficient for most purposes. It cannot be said that this contrivance has been extensively used, but the principle is evidently sound, and fairly promises to provide us with a self-acting system of ventilation.

(To be continued.)

SANITARY INVENTIONS.

IMPROVED DOMESTIC APPLIANCES.

The Anglo-American Tin Stamping Company, Stourport, have drawn our attention to their improved saucepans, wash-basins, etc., manufactured by them in this country by American machinery. By their process, tin saucepans and other articles, generally made in separate pieces and joined with solder, are stamped out of one piece of material at a single operation. The various utensils produced by this process are light, durable, and neat in appearance; but what is of more importance, have no crevices or seams affording lodgment for dirt or grease. Their Anglo-American enamelled ware is an entirely new article of wrought-iron hollow-ware. It differs from similar articles of European manufacture in the tenacity with which the enamel clings to the iron upon which it is fused, in the brilliancy of its glaze, and in the ornamentation, due to the colouring oxide supplied by the iron body, which, in the enamelling process, is absorbed by the glaze and distributed through it in a variety of attractive forms. The principal value of the new process, however, consists in the absolute purity of the constituents of the enamel and their perfect insolubility under any action of heat, acid, or water in culinary operations, thus ensuring safety in use. This ware is also cheaper than the ordinary inferior enamelled ware. All kinds of domestic utensils are manufactured from this substance, as saucepans, milk-pans, pudding-pans, gipsy-kettles, frying-pans, fish-kettles, etc. The impossibility of any deleterious chemical action being set up in these manufactures, as French investigations have shown to be the case in some forms of enamel applied to culinary utensils, must ensure a demand for them when their safety and cleanliness are made known to the public at large.

THE ASHANTEE POCKET HAMMOCK.

This handy little hammock is, as its name implies, capable of folding up into a small compass. It is supplied in a strong American leather cloth case, with tape attached, for slinging over the shoulder. The weight, case included, is about two pounds. Strong thin twine, like whipcord, is the material of which the hammock is constructed. Two hooks, which will screw into a floor, are also supplied. To enumerate a few of the uses to which the Ashantee hammock can be applied—it serves as a comfortable bed, a luxurious lounge, a means of transport of invalids by road or rail, for use on board ship, for picnic parties and tourists' use; as a swing for children, a cover for horses, if used as a net; a means of carrying the wounded in war, a stretcher for accident cases, a foraging bag, and for carrying in palanquin fashion. Temporary hospitals may be fitted up with the hammocks almost as soon as erected, as it takes but about a minute to properly fix the apparatus after the necessary supports are in place. The possessor of one of these useful articles will, however, find out for himself other means of utilising it; for, though slight in appearance, it will safely bear the weight of two adults, and will even for a short time support half a ton, if securely supported. Messrs. Seydel and Co., 7½, St. Mary's Row, Birmingham, are the manufacturers and patentees.

THE HAYWARD AND DRYSDALE SYSTEM OF HOUSE VENTILATION.

On Saturday, the 6th inst., a numerous party of gentlemen assembled at a new residence—No. 3, Third Avenue, Brighton, on the invitation of the owner, to hear a paper read by Dr. Hayward, of Liverpool, upon the system of ventilation adopted there, a system invented by Dr. Drysdale and himself as far back as 1861, although considerably improved by them since that time. After the short paper was read, the purport of which we give below, Dr. Hayward accompanied the visitors over the building, and explained the chief features of the system.

Ventilation, said Dr. Hayward, is not merely the infusion of fresh air into a room to mix with that already there, but it involves the removal of the already existing air, and its replacement by fresh air. This can easily be accomplished by opening windows and doors; but experience forbids this method of house ventilation when the outer air is cold, *i.e.*, when it is below 50° F., which in this country it is for at least six months in the year, we then shut the windows and doors, and even apply sand-bags to the windows and list around the doors, to prevent fresh air entering. All admit that the air must be removed and replaced by fresh air, and the necessities of the case require the air of the room to be changed once every twenty or thirty minutes at least. He begged to describe the one and only plan that has borne the test of experience, viz., that which the visitors were invited to see in operation.

The conditions which experience has proved to be essential are:—That the air to be admitted must first be warmed up to at least 60° F. It must be admitted in quantity sufficient to fill the room every twenty or thirty minutes; it must have ingress when the doors are shut; it must have egress at or near the ceiling; it must be drawn or sucked out. The suction power must be sufficient to empty the room every twenty or thirty minutes; it—the suction power—must be constant, must be self-acting, must be inexpensive; and, lastly, the whole house—lobbies as well as rooms—must be included in the arrangements as first carried out by Dr. Drysdale, of Liverpool, Dr. Hayward's colleague.

The suction power must be sufficient to empty the house in twenty or thirty minutes; it must be constantly in operation, automatic or self-acting; must abstract from every room equally, and must be inexpensive. The fresh air must enter each room in sufficient quantity to fill every twenty or thirty minutes, and it must enter imperceptibly, and at a temperature no lower than 60° F.; it is necessary, therefore, that it should enter the house by a special opening, and be warmed as it enters, in some central or separate lobby, hall, or other reservoir. These

are the main essentials of house ventilation, and these are carefully attended to in this kind of arrangement. These conditions can be met in a variety of ways. They have been met in one way at Dr. Drysdale's house at Waterloo; in another in Dr. Hayward's in Liverpool; and another in this house at Brighton. One thing, however, is a necessity, viz., that the kitchen fire, or rather the waste heat of the kitchen fire, shall be utilised as the suction power, the kitchen fire alone in every house being lighted daily throughout the year, and no other means of suction power for house ventilation being costless and automatic. This utilisation of the waste heat of the kitchen fire is the peculiar invention of Dr. Drysdale. It is quite necessary that the suction power shall draw equally from all the rooms at the same time: but in procuring this a mechanical difficulty presents itself, viz., that the source of the power is single—*i.e.*, the kitchen chimney—whilst the rooms are many, and at different heights and at different distances from it. Of course, if the exit flues of the different rooms entered the upcasts at different heights, the suction power would act more strongly on some than others, if not to the exclusion of others. This difficulty has been overcome by having a central or intermediate chamber or drum into which all the exit flues terminate at the same level, and from which one single flue leads into the upcast. This adoption is also one of Dr. Drysdale's inventions. In conclusion, Dr. Hayward insisted on the many and great advantages to health and comfort of an abundant supply of fresh air in our houses, and at an agreeable temperature all the year round, day and night alike. One of the chief advantages to health is the constant change of air in all bed-rooms, so as to prevent the possibility of breathing the same air twice over. People spend at least one-third of their life in their bed-rooms, with the doors shut, in ordinary houses breathing the same air over and over again, inducing that depression of vitality which shows itself in the pallor, langour, and desire for the stimulating influence of a smoke or a walk out of doors before breakfast, which is so generally felt.

There can be no doubt whatever that the system adopted by Drs. Hayward and Drysdale commended itself generally to the visitors present; but there were several drawbacks felt which somewhat interfered with the success of the meeting. For instance: the house is newly built, and the walls were not perfectly dry, therefore absorbing part of the heat, and, moreover, the boiler, which heated the fresh air drawn in from the external atmosphere, was at least one-third too small for what it had to perform. Despite these failings, the current meter showed a steady influx and efflux, and any down-draught was clearly not traceable to any fault in the system, which is for the most part applicable to existing houses not specially built for this system of ventilation. It may be added, that the method of ventilation here exhibited can be produced in a diversity of ways, the only requisites being a supply of warmed air equal to a renewal of that in the house every twenty or thirty minutes; a heated upcast, equal in sectional area to the inlet; an intermediate foul-air chamber to collect the vitiated air traversing the ducts in the various floors, and a shaft high enough to exert a suctional power. The central lobby once heated, the fresh warmed air therefrom delivers itself from one side of the rooms at cornice level, and, after traversing and filling the room, it rises to the outlets on the opposite cornice, and passes to the main outlet shaft. Thanks were duly tendered to Dr. Hayward, at a déjeuner subsequently held at the Prince's Club.

SPOROKTON.

Amongst the disinfectants exhibited at Croydon, Sporokton must certainly be placed in the first rank. Medical authorities and sanitarians have long known that sulphurous acid as a fumigator is the most potent disinfectant hitherto discovered. The recent experiments of Dr. Mehlhausen of Berlin, and Dr. Wernich of Breslau, show that the most energetic and cheapest disinfection is obtained by sulphurous acid. In Dr. Wernich's experiments it was found that putrefaction was completely prevented in solutions of fæces, meat, and other putrescible substances, when exposed for six hours to air charged with from about 4 to 7·15 per cent. of its volume of sulphurous acid. The American Board of Health, in a recent report on disinfectants, with especial reference to the last yellow fever epidemic, says in effect with Homer, 'Bring blast-averting sulphur'; 'Nurse, bring fire, that I may fumigate my walls'—by declaring that fumigation with sulphur is the only one suited to the disinfection of the house. To these testimonies may be added the valuable opinions of such authorities as the late Dr. Parkes, Drs. Baxter, Dewar, Angus Smith, Dr. Wilson, and Mr. Crookes, amongst others. Sulphurous acid has not hitherto been so generally employed for disinfecting purposes as would have been desirable, on account of the difficulties and inconveniences which formerly attended its generation. The progress of chemical science has, however, removed these obstacles; and in the able hands of Dr. Tuson, this valuable antiseptic and deodorizer has, in connection with chloride of zinc, become universally available at a trifling cost. Sporokton is prepared in the form of liquids of varying strength, for the deodorization of hospitals, sick rooms, and so forth, and also in a solid form, which evolves sulphurous acid, and acts as an excellent ærial disinfectant and antiseptic. We have no hesitation in expressing our personal approbation of Sporokton as an efficient antiseptic and deodorizer, and in recommending its use for those purposes. It is to be obtained in its various forms of Messrs. Sutton and Phillips, Stowmarket.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

VENTILATION OF SEWERS BY SOIL PIPES.

I shall be obliged if you will allow me to correct an error in your report of the remarks I made on Mr. Bailey Denton's paper at the Croydon Congress of the Sanitary Institute (page 195 of your last issue). You there say that I maintained 'that they should not ventilate the public sewers'. This is an error. What I did mention was 'that the soil pipes of houses should not ventilate the public sewers'. I yield to no one in the advocacy of the most thorough ventilation of the public sewers, but I consider that to use the soil pipes of houses for the purpose, as recommended by Mr. Bailey Denton, is a serious mistake. The house drains should all be disconnected from the public sewers, and the soil pipes should ventilate the house drains only, not the sewers. ROGERS FIELD.

5 Cannon Row, Westminster, S.W. Dec. 2, 1879.

NOTICE.

IN consequence of the great pressure on our space, much correspondence and many articles of interest are of necessity held over till next month.

ORIGINAL PAPERS.

NOTES ON INDUSTRIAL DWELLINGS.

By ELIJAH HOOLE.

I.—SITES.

DESPITE all known laws of health, the mass of our working population is crowded by eight or ten families at a time into dwellings intended to house a single family only. This is especially the case with the lower stratum of the working class, where each family has but one room for its dwelling. Run up originally by a speculating builder, with the minimum of materials and labour, and with absolutely no feeling of responsibility either for the soundness of the work or the health of the future tenants, but with a vague intention that the house and the lease should fall in together, such a dwelling at its best could never be a really healthy habitation. Without protection from the damp exhalations from the surface of the ground on which it stands, or from the damp which naturally rises in its walls, with leaky drains below it, and foul gas drawn into it from waste pipe and grating, it is wonderful if its inmates long escape disease. The spaces between floor and ceiling in each storey, originally mere air spaces, have been long since filled with dust and filth, which has gradually accumulated, entering through the cracks between the shrunken boards, and now forming a solid mass of filth where it is not a moving mass of vermin. From these accumulations much of the foul odour proceeds which is often noticed in the dwellings of the poor. In such a house as this the water for all purposes of drinking, cooking, washing, etc., is stored in a cistern, often of lead, placed over a water closet and directly connected to it with a pipe, while another pipe, taken into the drains to serve as an overflow pipe in case of the cistern becoming too full, conducts the sewer gas into the water. After standing for a time over foul sediment and the living creatures breeding in it, and being well impregnated with sewer gas, it is drawn through a pipe to the single tap which, placed over the back kitchen sink, or yard gully, supplies the household, when there is but one, with water. There is but one water closet, and all household appliances are single. Bad enough, surely, when inhabited by one family. But to realise the mode in which our inferior workmen are lodged we must suppose such a house with every kind of dilapidation and decay, and then put a family in each room. There they have to be born, to live if they can, and there they have to die. The squalor, the wretchedness, the foulness of many of these places is unutterable.

Efforts have been made to improve the houses of the poor, but these, extensive and successful as they have been, have only overtaken the increase in the population, leaving the original mass of misery all but untouched. One important fact has, however, been demonstrated—that really sound and healthy dwellings for the working class will bring in a fair pecuniary return for the capital expended. This has been clearly proved again and again, indeed, it receives repeated demonstration every time these investments pay their dividends, which they do with great regularity.

In the erection of industrial dwellings it is most important to secure a suitable site and subsoil. An opportunity of selecting a site for industrial dwellings does not always occur, as the site is usually one which has been previously occupied by small houses, and rebuilding on an improved plan is all that is possible. Occasionally, however, new sites can be chosen; narrow streets and courts with arched entrances can be avoided, and preference can be given to land adjoining open spaces and wide thoroughfares, with ample air and sunshine. Such sites have been chosen by the Bristol Dwellings' Company for their Jacob's Well and Brandon Buildings, and by the South London Dwellings' Company for their South Lambeth Dwellings on the site of Surrey Lodge. The advantages of light and air thus secured in perpetuity for the tenants cannot be over-estimated. At first sight it appears as though such positions as these were too good and too costly for workmen's dwellings, but the rents paid by such tenants will quite justify the selection of open and airy situations, and prove that the crowding back of the labouring population into close courts and alleys behind the principal streets is as unnecessary as it is unwholesome. Some local opposition must be anticipated from the owners of property in the immediate vicinity, who are seldom enlightened enough to perceive that the health of their poorer neighbours is a direct advantage to themselves.

A pure subsoil is greatly to be desired under all inhabited buildings, but is almost always unattainable in town, where the subsoil is often black, and frequently is largely composed of accumulations of various kinds, not always the most choice, generally penetrated and saturated by the leakage from old drains and cesspools. The Metropolitan Board of Works in October last issued some bye-laws providing for the removal of refuse previous to the erection of dwellings upon the ground containing it, regulations which though late in appearing will be very useful henceforth. Even when all offensive matter has been removed it is necessary to bind down the exhalations from the soil by a layer of concrete, and to ventilate the space between this layer of concrete and the lowest wooden floor of the building. Happily the deodorizing and disinfecting powers of the ground itself prevent a great deal of the mischief which would otherwise arise from the decomposition of the various ingredients often contained in the soil below inhabited buildings. In a nobleman's town house examined a few days ago it was found that the drains laid below the building had been stopped for months, during which time the entire liquid sewage of a large establishment had been filtering through the leaky joints of the stoneware pipes into the stratum of gravel below the house, while the solid sewage remained in the drain, which was found nearly full of foul black mud. No illness had occurred to any of the inmates, and it was only when an excavation was made for the purpose of examining the foundations of the house that the state of the drainage was discovered. If such a state of things could exist under a nobleman's mansion, what may not be expected under houses of a humbler description. Nor can it be hoped that the results will be often as harmless. Still the action of the earth upon foul matter in the subsoil does to a great extent protect the unsuspecting persons who live over these abominations, the percolation of the sewage through unsound drains being the rule and a watertight drain the exception. Preference should be given to a subsoil of gravel or sand, wherever a choice can be made, since a porous substratum of this kind is not only healthier and drier than any other, but the cost of building is greatly reduced when the gravel and sand which form a considerable part of the building

material are found on the site. The cost of the material and that of the cartage is saved, and an opportunity is generally afforded of filling in with surplus earth or building materials which would otherwise require expenditure for their removal.

Level land is less costly to build on than sloping land, and a site at or very slightly below the level of the adjoining roadway will be built on more economically than one either above or considerably below it, there being an exception to the latter case where basements are required.

If the subsoil be retentive of moisture it should be well drained by agricultural drains laid deep and put in some time before the building is carried up, the withdrawal of water from the subsoil after the erection of a building being often the cause of serious damage to the structure.

Open spaces should be left on all sides of each block of industrial dwellings, unless wide roads already surround the site. The provision of the Building Act of a minimum of 100 feet super. to each dwelling house is absurdly insufficient, especially in the absence of dimensions. A yard might be made only two feet wide and yet be in accordance with the Act.

THE HYGIENE OF FOOD.

By Ernest Hart.

No. I.—BREAKFAST.

The skilled cooking of economic materials affords a theme on which it is popularly supposed to be easy to preach, and far from easy to carry doctrine into practice. I believe, however, that a very little patience and intelligence will show anyone who chooses to make the trial, that practice by no means presents the difficulties which it is popularly supposed to do. I shall defer for the present, reference to the more elaborate efforts of the kitchen, as to which I shall have a good deal to say presently, not as a matter of theory, but in giving the actual results of my own experience, since I have turned some serious practical attention to this subject; and, I shall now speak only of the mode of preparation of the very simplest and cheapest kinds of food in the simplest and cheapest way. I shall begin with breakfast, and breakfast foods. The ordinary drink of English people for breakfast is tea, and with it they eat bread and butter, and when they can afford it they add to this bacon, eggs, or any of the higher range of breakfast luxuries in which they choose to indulge. I should like to see the tea-pot abolished from the breakfast-table. I believe tea to be a drink utterly unsuited for an early morning meal, and one which has only come into general use because it is the easiest sort of hot infusion which bad cooks, careless housewives, and thoughtless mothers can prepare. Tea is an 'aliment of physical economy'—using that word in its physiological sense. So far as the alkaloid of tea has a physiological effect in the small quantity in which we get it at breakfast, it is a nerve stimulant, and it is believed, rightly or wrongly, to diminish excretion; two properties which are far from indicating it as a breakfast drink, and which are not those for which we look in the morning. Breakfast should be digestible, warm, abundant, unexciting, nourishing. I am not going to quarrel with bread and butter, especially with other people's. It is a typically good food, though not always presented in the most agreeable form, and far from being the most appetizing or cheapest of its class. Bread and butter, and hot cocoa, make a very good breakfast for working people, but not perhaps the cheapest they can get, or the handiest. I believe very firmly in our good English household white bread. One hears a good deal, and reads a good deal, of the waste in grinding off the outside husk, which contains nutritious gluten. The apparent economic waste is palpable enough. On the other hand, the silicated husk of all cereals is apt to be irritating. It hurries the digestion, quickens the passage of food through the intestinal tract, and I am inclined to believe that the actual physiological waste is greater in a brown bread than in a white bread diet. It is easy to take a superficial view of this question, and superficial reformers are always wanting to turn the world upside down. The instinct which has led to the preference of white bread over brown in places and under circumstances where the two can be had side by side, is nothing else than the crystallized experience which has taught people unconsciously that they are more comfortable after eating the white bread, and that the solid household bread, which is the staple food of the working-classes of this country, is in the end the most sustaining. A good deal is to be said in favour of some of the forms of 'whole-meal bread', in which the husk is partially ground off and the inner pellicle of the grain is very finely ground, and mixed in that condition with the white flour. Moreover, it is undoubtedly a fact that under certain circumstances, in lymphatic temperaments, and in conditions tending towards scrofula, where the diet has to be carefully supervised, and in certain forms of dyspepsia, where something like mechanical excitation of the intestinal tract is useful, whole-meal bread is an extremely valuable article of diet. But those are cases which I am not considering. For the working man, for the poor man, and for every-day use, I doubt whether anything has yet been produced in any country of the world which is equal to the English household bread. But when we pass out of this category and come to consider what is to be the cheap, warm, nourishing breakfast with which, at the least trouble and the smallest expense, and with the greatest success, we can nourish our children, ourselves, our servants, and our labourers, then we have to consider the claims of an immense class of cereals, of which, to our shame, we make but little use in this country, and thereby suffer a great economic and hygienic loss. Wheat is a costly cereal, and it is not the most nourishing, nor does it lend itself well to those pleasant, wholesome, nutritious, and comforting forms of foods known as porridges, which do form the staple breakfast throughout Scotland and throughout that vast American continent which is now peopled with English, Scotch, and Irishmen, and from which we have so much to learn and so much to gain. I need not say very much about oatmeal porridge, but I think I ought to say that a great many people in this country think they do not like porridge because they do not know what porridge is, and never eat really good oatmeal porridge. Oatmeal porridge to be palatable must be made with rough, largely ground Scotch oatmeal, and cooked according to some such recipe as the following:—'Boil 1½ pints of water; then take two handfuls of coarse Scotch oatmeal and drop in steadily with two tea-spoonfuls of salt; constantly stir and boil for thirty minutes.'

I doubt, however, whether a taste for oatmeal porridge is readily acquired after ten years of age. There is something peculiar in the flavour of oatmeal which every southern palate does not readily take

to, when once it has been formed to the special love of wheaten foods. There never was born a child, I should think, who did not love oatmeal porridge if it was given to him early, and for all the purposes of nutrition it is a most admirable food. Good coarse-grained Scotch oatmeal is not, however, under present conditions in London at least, the cheapest of breakfast foods. The grinding of oatmeal for porridge is a sort of art which seems to be confined to comparatively few. The supply of the article is limited, possibly because the demand is comparatively rare, and the price is high. All this ought to be altered. There is no reason why oatmeal should cost nearly twice as much in London as it does in Edinburgh, or why porridge, which is the very perfection of a breakfast luxury, should be so rarely seen on London tables. I have spoken of oatmeal first because it has the strongest claim upon the respect and attention of every patriotic Briton. Nevertheless, I must confess to a personal preference for hominy porridge. Hominy porridge is the staple breakfast of the American continent. For young people, for reasonable quiet people, for dyspeptics, for working people, for bankers and brokers, who want to keep their digestions in good order, and to be able to work satisfactorily, hominy porridge is the only food. Hominy is nothing else than a fine kind of Indian corn, ground roughly and largely like Scotch oatmeal, and the way to make the porridge is to soak it in cold water all night, and to boil it for half-an-hour in the morning, stirring it frequently to prevent it from burning. When boiled, each grain should be soft and separate, like well-boiled rice. It should retain its opaque whiteness, and should not be watery or semi-transparent, or else it may be known to be over-cooked. Neither should it run into masses, or coagulate in lumps; all these are the indicia of careless cooking. They may be easily avoided, and hominy which does not come up to table with every grain soft and separate, and showing a pure, opaque, pearl-like whiteness, should be sent down again and devoted to some other use, such as frying in slices. When served in a hot bowl (with a pile of hot plates), it is best eaten with milk and sugar by the luxurious. To children and simple-minded people it is delicious with skim-milk and treacle, and of all the cheap, wholesome, digestible, delicious breakfasts which the world affords, I do not know any which can compare with a dish of hot hominy with skim-milk and golden syrup. It would delight the heart of any British child. There is no epicure who retains a palate capable of appreciating simple purity of flavour, or a mind capable of appreciating the best gifts of nature prepared for gastronomic enjoyment, who will not find in such a dish of hominy one of the most perfect luxuries which could be put before him. I should like to hear that some of the royal children take hominy, skim-milk, and golden syrup every morning for breakfast. It would make it fashionable, and such a dish requires only to be fashionable in this country in order to become universal, and to be as popular in the palace as in the peasant's cottage. One practical inconvenience is sometimes found in preparing porridge, and that is the necessity of steeping the hominy over night, and spending half-an-hour in boiling it in the morning. It is often a great desideratum to be able to prepare breakfast very quickly; it is sometimes a great convenience to be able to get breakfast ready in ten minutes. Moreover, it saves firing, where only one fire is lighted for the workman's breakfast, to be able to reduce the amount of cooking to the smallest possible limits of time and heat. This desideratum is, however, perfectly met by the introduction of steam-cooked oatmeal, hominy, barley food, and maize. These A, B, C cereals, as they are called, are steam-cooked and dried: the grain is thoroughly cleansed and hulled, crushed, cooked by the application of moist steam, and dried. They require, therefore, but little time for their after preparation for table, and thus place within the reach of the most unprovided bachelor, or of the most economical or hurried housewife the means of furnishing at ten minutes' notice a hot nourishing delicious breakfast, such as may well form the staple food of a family. Some people prefer to eat all these porridges with a little salt, and those who have acquired that excellent taste will find that eaten with butter-milk they form perhaps the most nutritious, cheapest, and best kind of breakfast that can be made. These A, B, C cereals include oatmeal, maize, hominy, and barley. There are other kinds of and uses for cereal food which I must defer to my next article, as I have not left myself space here.

THE WINTER CLIMATE OF SOME OF OUR HEALTH RESORTS.

By JOHN W. TRIPE, M.D.,
Secretary to the Meteorological Society and Medical Officer of Health for Hackney, etc.

(*Continued from p.* 216.)

BARNSTAPLE, ILFRACOMBE, LLANDUDNO, AND TORQUAY.

ILFRACOMBE AND BARNSTAPLE.—I have selected these towns as the representatives of this part of the coast of Devonshire because reliable records have been made there by T. Mackrele, Esq., during the period selected for comparison, whilst those for Ilfracombe are for different years, but are equally reliable.

BARNSTAPLE.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature.. ..	46.6	43.1	45.0	43.8	44.5	44.6
,, of all the highest ..	51.9	47.3	49.7	48.6	50.8	49.7
,, of all the lowest ..	41.8	38.1	40.3	39.5	39.7	39.9
,, daily range	10.1	9.2	9.4	9.1	11.1	9.8
Monthly range	31.8	29.8	28.1	25.0	30.3	29.0
RAIN.						Total.
No. of days	19	20	22	15	16	92
	in.	in.	in.	in.	in.	in.
Total fall	3.97	4.37	4.89	2.54	2.68	18.45

The climate of Barnstaple differs considerably from that of Penzance and its neighbourhood, as well as from London, by having a mean winter temperature below that of St. Mary's, amounting to 3.3°; of Penzance of 1.2°, whilst it is above that of London by 2.7° Fahr. The mean temperature for November was 2.0° above the average of the five months, whilst that of December, the coldest month, was only 1.5° below it, so that the range of mean temperature was not large. The mean of all the highest was 49.7°, that for London being 46.9°; of the lowest, 39.9°, whilst for London it was 35.9°, giving a mean daily range of 9.8° against 11.0° in London. The average of the extreme range in each month was 30.3°, against only 18.7° at St. Mary's, 21.3° at Penzance, and 32.9° in London. The mean humidity was 86 against 88 in London, with a rainfall of 18.45 inches, and 92 rainy

days against 10.2 inches of rain, and 83 rainy days at London. On a careful comparison of the Barnstaple and London tables, we find that the greatest difference in favour of Barnstaple occurs in the months of January, February, and March. In Barnstaple the means of the lowest were respectively 40.3°, 39.5°, and 39.7°; in London 36.0°, 34.9°, and 35.6°, and the mean of the daily range was 9.9° against 11.8° in London, and of the extreme range in these months, 27.7° against 32.3°. The means of the highest in the months of December, January, and February were all more than 3° above those for London, so that the North Devon winter climate is not only warmer, but less liable to change than that of London. The month of March does not, however, possess so great an excess of heat above that of London as in the other winter months.

In giving the meteorological elements for Barnstaple, it must not be supposed that I recommend it as a winter residence for invalids. It is not situated on the sea-shore, but on the estuary of the Taw, and therefore has a lower mean temperature and a greater range than Ilfracombe, which is a delightful watering place, situated eleven miles north-west of Barnstaple and built in terraces, so that fine views of the Bristol Channel can be had from most of its houses. The town is built on slate and quartz, so that the heaviest rain speedily dries up and admits of walking exercise being taken, and also prevents the undue moisture of the air caused by considerable evaporation from damp ground. It is almost surrounded by heights, commonly called Torrs, the most important of which, the Capstone, shelters the town from the northerly winds. This height is conical in form and has a promenade scooped out of its face, which is one of the great features of the place. The Medical Officer of Health, Dr. Slade-King, says that the climate is essentially oceanic, sharing in full all the advantages derived from that peculiar equability of temperature common to the greater part of Devonshire; that malaria is unknown, as there is no marsh land or stagnant waters. The summers are cool and the winters warm, as the heat of the former is modified by the cool breezes of the Atlantic, and the coldest weather in winter, by local or other causes which raise the temperature to a genial warmth, and thus render it one of the most favourite winter residences in England. A winter of bracing, invigorating, but genial warmth; a climate which is above the average in point of health of most English winter health resorts, and which is especially favourable to all cases of general systemic relaxation, dyspepsia, gout, nervousness, many forms of mental derangement and diseased kidneys. The chief objection appears to be that is termed 'blowy'; but on this point, Dr. Slade-King says 'that the best climate for consumption is that which permits the greatest number of hours being spent out of doors, and when constant bracing breezes prevail with an equable climate and the rare occurrence of frosts', and that Ilfracombe fully complies with these requirements. The mean temperature of the winter is said to be two degrees higher than that of Exeter, and as high as that of Torquay, but this is a slight error. Sea bathing, especially at Rapparee cove, may be indulged in long after it has ceased at most other places. Snow rarely falls, and soon melts, at Ilfracombe; the average number of frosts does not exceed five a year, and mists rarely occur. The vegetable kingdom shows, as at some of the other resorts, the mildness of the winter, for although many plants which thrive in the Scilly Isles will not winter at Ilfracombe, yet camelias, myrtles, salvias, verbenas, fuschias, ixias, veronicas, and other exotics, flourish all the year round in the open air, and wild strawberries are frequently found ripe in January. A comparison which I have made for Ilfracombe of the three winters, 1872-75, from data furnished to me by Dr. Slade-King, shows that this town is considerably warmer than Barnstaple, but not qute so warm as Torquay, the means

MEAN TEMPERATURES.—WINTERS OF 1872-75.

	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
	°	°	°	°	°	°
Torquay	49.5	45.6	47.4	41 6	47.3	46.3
Ilfracombe	48.6	45.2	47.3	42.0	46.0	45.8
Barnstaple	47.3	42.6	45.9	40.8	45 9	44.5

for the five winter months in the three years, 1872-75, being 46.3° at Torquay, 45.8° at Ilfracombe, and 44.5° at Barnstaple; the mean temperature of December, January, and February being nearly the same at Ilfracombe and Torquay, and decidedly higher than Barnstaple, that of March being higher at Torquay than at Ilfracombe. The means of the highest daily temperature was greater at Torquay, but those of the lowest varied but little. The greatest difference, however, occurs in the rainfall, which is almost the same at Torquay and Barnstaple, but is much less at Ilfracombe, as the following comparison shows:—

AVERAGE RAINFALL.—WINTERS OF 1872-75.

	Nov.	Dec.	Jan.	Feb.	Mar.	Total.
	in.	in.	in.	in.	in.	in.
Torquay	4.18	3.72	5.25	3.32	2.20	18.67
Ilfracombe	2 17	3 37	4.12	1.40	1.67	12.73
Barnstaple	3.82	4 75	5.09	2.30	2.36	18.32

It will be seen from the above that in each of these months the rainfall was below that of Torquay and Barnstaple, and especially in November, February, and March. It is, however, noteworthy that in Symon's British Rainfall, for 1877, there is a great difference in the amount registered at the two stations at Ilfracombe, one, the lowest, 34 feet above the sea-level, being nearly 37.82 inches, and the other, 228 feet above sea-level, registering 57.19 inches; but the difference of elevation cannot account for the variation in the amount of rainfall at these stations. I have given more space than usual to Ilfracombe as its winter climate is so little known.

LLANDUDNO.—This town, like the Scilly Isles and Ilfracombe, is little known as a winter health-resort, although it is warmer, both by day and night, than several places which are much resorted to. It is a small town of about 4,000 inhabitants, and is said, by Dr. James Nicol, the medical officer of health, to be capable of accommodating 12,000 visitors. It is situated in the county of Carnarvon, on the eastern side of the promontory forming the Great Orme's Head, and about four miles from Conway. The Great Orme's Head is composed chiefly of carboniferous limestone, is nearly perpendicular, and shelters the town from the north and west; whilst the little Orme, and contiguous hills, form a screen in the south-east; so that, from whatever direction the wind may blow, the town is sheltered, except those winds which come from the sea. Dr. Nichol states that the average number of frosty days per annum is 19.4, being six in January, 4.5 in February, 3.5 in March, 0.5 in November, and 4.3 in December, which are decidedly in excess of the number at the other places hitherto mentioned. He, however,

shows that the mean winter temperature was higher than at Osborne, Bournemouth, and Brighton. The reasons assigned for its comparative warmth are, that it is sheltered from the north by the Great Orme, and is surrounded by the sea on three sides, the town virtually enjoying the climate of an island. As the sea, warmed considerably by the Gulf stream, has a winter temperature much higher than that of the air, its warming effect on the climate is very obvious.

LLANDUDNO.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature	45.1	42.9	44.1	42.3	43.3	43.5
,, of all the highest ..	49.5	46.5	49.2	47.1	49.3	48.3
,, of all the lowest ..	40.8	38.5	39.0	37.8	38.0	38.8
,, daily range	8.7	8.0	10.2	9.3	11.3	9.5
Monthly range	31.8	29.8	28.1	25.0	30.3	29.0
RAIN.						Total.
No. of days	19	14	16	18	16	83
	in.	in.	in.	in.	in.	in.
Mean monthly fall ..	4.24	2.86	4.94	2.69	2.13	15.96

The monthly mean temperature in November is 5° below that of Scilly, 2.5° below Penzance, 3.3° below that of Guernsey, 3.9° below Torquay, 1.5° below Barnstaple, about 3.6° below Ilfracombe, 2.6° below Ventnor, but nearly 1.0° above Ramsgate and Hastings. In December, however, the differences are not so great, as the mean temperature of this month is nearly the same as Ventnor, Barnstaple, and Llandudno, but is about 2½° below Penzance and Torquay, and about 1° below Ilfracombe. In January and February it was about half a degree, and in March 7-10ths degs. colder than Ventnor. It was, however, rather considerably warmer than London, having an excess amounting to 1.7°. in November, 3.2° in December, 2.6° in January, 3.5° in February, and 1.0° in March, the mean for the five winter months being 43.5, against 41.3°. in London. This shows a substantial difference, as Hastings and Ramsgate had a mean of about half a degree only in excess of that for London. The mean of all the lowest at Llandudno, although considerably below that of Scilly and Penzance, about 3° below Torquay, and probably 2° below Ilfracombe, was 3° above London, and about 1° above Hastings, and nearly 2° above Ramsgate. The mean daily range, which is a point of considerable importance to invalids, although comparatively small in November and December, was large in January and February, and especially in March; the mean for the five months being 9.5°, against 6.0° in Scilly, 6.0° at Penzance, 7.9° at Guernsey, 8.0° at Ventnor, 9.8° at Barnstaple, 11.0° in London, 8.1° in Hastings, and 9.6° at Ramsgate. The total rainfall, and number of rainy days, were smaller than at Scilly, Guernsey, Barnstaple, and Torquay, and the number of rainy days at Hastings were the same as in London, but less than at Ramsgate; whilst the total rainfall exceeded that of Ventnor and Ramsgate, and probably Ilfracombe, and was much greater than in London. It is, therefore, evident that the winter climate cannot be suitable for the same cases as the sanitaria of Scilly, Cornwall, and Devon; but as it is warmer than Ramsgate and Hastings, and as Dr. Nicoll shows, than Osborne, Bournemouth, and Brighton, during 1873-4, it is most probable that cases similar to those which benefit by a winter at these localities, would also receive relief at Llandudno. Dr. Nichol gives the following table for 1873 at these localities. I add that of Ilfracombe for the same year, showing how much warmer that locality was than either of the others.

MEAN TEMPERATURES 1873.

	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
	°	°	°	°	°	°
Llandudno	44.8	45.5	43.4	38.5	44.1	43.3
Osborne	45.9	42.8	42.6	35.8	43.7	42.2
Bournemouth	45.5	42.8	43.6	36.3	42.9	42.2
Brighton	45.6	42.4	42.5	35.2	43.2	41.8
Ilfracombe	48.3	46.5	45.8	39.6	46.1	45.3

The mean humidity of the air is less at Llandudno than at any other sea-side station with which I am acquainted; so that it is evident that persons suffering from bronchitis, or recent congestion of the lungs, should not winter there; but the climate appears suitable for those who are affected with dyspepsia, nervous diseases, general depression of the system, or, indeed, in most cases, of want of tone. As to consumptives, if the disease were not too advanced, I think they would probably receive considerable benefit, except in March. Hydrangeas, calceolarias, myrtles, veronicas, fuschias, scarlet geraniums, flourish in winter out of doors. Dr. Nicholl considers the climate 'is possessed of those rare and valuable qualities requisite to constitute it a high class health-resort in winter, as well as in summer; but its excellence of climate, especially in winter, comes more prominently out when a comparison is instituted with some of the most favoured and frequented watering-places in the south of England'.

TORQUAY.—The winter climate of this well-known health resort is intermediate between that of St. Mary's, Penzance, and Ventnor, possessing much of the mildness of the former, and with land winds, part of the bracing character of the latter. The temperature varies, however, with the situation of the house as regards elevation and amount of protection, and it is probable, as the residence of Mr. Vivian, to whom I am indebted for the observations from which the table is compiled, is unusually sheltered, that the temperature, especially at night, is somewhat higher than that of most other localities at Torquay. The climate has the reputation of being less moist than that of most places on the south coast of Devon, but I am unable to express an opinion on this point, as I have no observations as to the mean humidity during these years. Mr. Vivian, however, in 'The Climate of Torquay', states that Torquay possesses a drier air than any place mentioned in the Registrar-General's report, exceeding Brighton by nearly 3, London by more than 2, and Clifton by more than 3, annually! As regards the number of rainy days during these years, which was on an average 98 out of 151, it is the largest but one at any

TORQUAY.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature	49.0	45.5	46.6	44.2	46.4	46.3
,, of all the highest ..	53.6	50.0	50.7	48.1	51.4	50.8
,, of all the lowest ..	44.3	44.1	42.5	40.4	41.3	41.9
,, daily range	9.3	9.0	8.2	7.6	10.1	8.8
Monthly range	27.2	26.2	23.0	24.7	25.4	25.4
RAIN.						Total.
No. of days	19	19	24	19	17	98
	in.	in.	in.	in.	in.	in.
Total fall	4.48	4.31	4.37	2.99	2.13	18.29

of the stations from which a record was obtained, as the mean at all the sea-side stations was 90, and at Camden Town only 83, that of Scilly being 107. The mean rainfall for the winter months was, however, lower than at Penzance, Guernsey, and Barnstaple, but above that of Scilly, Ventnor, Llandudno, Ramsgate, and Hastings. The mean temperature for five months was 46.3°, being higher than at any other station except Scilly—viz., half a degree above Penzance, nearly one and a-half above Guernsey, nearly 2° above the mean at Ventnor, and 5° Fahr. above Camden Town. The excess at Torquay, as compared with the mean temperature of London in the different months, was as follows: + 5.6° in November, + 5.9° in December, + 5.1° in January, + 4.4° in February, + 4.1° in March. The mean of all the highest was 50.8° against 46.9° in London, and, what is of more importance, the mean of all the lowest (night) temperature was 41.9° against 35.9° in London. The daily range of temperatures was also much smaller than in London, although the highest temperatures were considerably in excess. The rainfall was, however, much greater than that of London, having been 18.29 inches against 10.08 inches. The excess occurred in every month—viz., 1.85 inches above that of London in November, 2 inches in December, 2.26 inches in January, 1.56 inches in February, and 0.53 inches in March.

One of the reasons for the equable and warm winter climate of Torquay is its position on a promontory which projects into the sea in such a manner that nearly one-half of its circumference is sea-coast, resembling therefore, on a very small scale, the peninsula of Italy. Dr. Shapter says 'that were it not for its excessive moisture it would possess the *El Dorado* of climates'. The greater part of the town lies immediately around the basin of the harbour, but there are houses scattered about at various elevations and with different aspects, so as to be suitable for almost any ailment, the air on the hills towards Babbicombe being somewhat bracing, whilst near the sea it is decidedly sedative and relaxing, as the surrounding country is considerably protected, rather long walks and drives can can generally be taken. There are a winter garden and aquarium and plenty of other places of amusement for visitors.

The climate is considered to be peculiarly suited for those having a consumptive tendency, as well as for those who are suffering from the disease in a more advanced stage; but statistics lately collected show that Hastings and Ventnor gave better results, so that it is most probable that dwellings situated on the hills would be more suitable for consumptives than those in the town. As regards invalids who are recovering from inflammatory diseases of the lungs, Torquay seems most suitable, as well as for those who are afflicted with chronic bronchitis. Patients of a sanguine temperament, who have heart disease, are generally benefited; but those who are of an opposite temperament rarely improve at Torquay. There rheumatism and tonic gout are generally relieved, but atonic gout, especially when the circulation is languid, is, as a rule, anything but improved by the air, its general tendency being to allay irritability and reduce the action of the heart. On this subject, Dr. Radcliffe Hall, in an address 'On some effects of the climate of Torquay' said 'It is not commonly known, but it ought to be, that Torquay is peculiarly desirable as a residence for those who are prone to suffer from diseases of the kidneys, and from gout and goutishness; not so much because the town water is very soft and pure, being mainly rain-water filtered through disintegrated felspar, from which it may derive possibly some inappreciable alkalinity, as because of the climate acting beneficially on the skin and mucous membrane, which is an internal skin. . . . In a word, all ailments which depend upon chronic inflammatory irritation of any mucous membrane are benefited by this climate.'

NOTES ON PRACTICAL DISINFECTION

AND THE USE OF 'SANITAS' AS A SANITARY REAGENT.

By CHARLES T. KINGZETT, F.I.C., F.C.S.

THE present state of specific knowledge relating to the causes of infectious and contagious diseases is of such a very unsatisfactory nature that it cannot serve as a guide to practical disinfection, if considered apart from the much more extensive and general knowledge which forms the sum of human experience. In the following notes, therefore, I do not intend to consider the various hypotheses of the causes of disease, which so much occupy and distract the thoughts of all who take an interest in this important subject, but merely wish to enunciate certain general propositions which may be safely used for the regulation of measures intended to prevent and arrest the spread of infectious and contagious diseases. This done, I shall proceed to describe some few simple experiments which have been made with the view of estimating the extent to which the sanitary reagent (Sanitas) originated by me possesses those properties which qualify a disinfectant for universal use. In the first place, it is matter of certain knowledge that the process of putrefaction is an insanitary one, and often originates disease. Innumerable outbreaks of disease have been traced to the putrefaction of animal and vegetable matters proceeding in or near human habitations. Now, putrefaction, beyond doubt, is initiated by certain low forms of animal life styled vibriones. These vibriones or their germs are practically ubiquitous, and in themselves are harmless, so far as we know, since most of the air we breathe and the water we drink, abounds with them. It is only when they introduce themselves into dead organic media that they develop and produce those poisons which are dreaded by sanitarians. Septicæmia, and a number of foul diseases, well known in the hospitals, are undoubtedly due to the action of these same poisons, and it may well be that certain other even more dangerous diseases have the same or a similar origin.* However that may be, almost the only means, at present available, for ascertaining the practical value of a disinfecting material, consists in ascertaining its power to prevent putrefaction. It must be clearly understood that, whereas putrefaction is initiated by animal vibriones, many kinds of fermentation are caused by low vegetable forms of life, and there is no kind of evidence that either such forms of life, or even the products to which they give rise, are harmful to man. The mould which grows in all damp, airy places, and the fungic growths which always attend upon slow decay, are examples

* Since Sanitas exerts an influence over those living agents which cause putrefaction (be it of a destructive nature to, or one of interference with, the normal function of vibriones), it is perfectly reasonable to infer that it exercises a corresponding influence upon other microphytes, and that this is so, experiments with various so-called ferments bear out.

of the forms of vegetable life now under consideration. So far, indeed, are such matters from being of a noxious character, that beyond doubt they serve a most sanitary purpose. By their agency the whole grand process of eremacausis (slow decay or slow combustion) is carried out. It is this process which ultimately burns all animal and vegetable compounds into carbonic acid, water, etc., which purely chemical substances are then available by plant life which requires them for sustenance. We do not want, then, to prevent slow decay or to render inactive those vegetable organisms which carry it out, but we only seek to prevent putrefaction and to arrest the activity of those animal germs which cause it.*

My first proposition, then, is as follows:—'In addition to certain other properties, a disinfecting material must be competent to prevent and arrest putrefaction, considered apart from innocuous processes of fermentation.'

Next, it is patent to all, that a chemical reagent intended for use as a disinfectant need not be of the same strength or activity under all circumstances. In other words, in certain cases a stronger form is required than in others. For instance, a reagent intended to preserve solid meat from decomposition must be of a greater antiseptic strength than one intended only to preserve a dilute extract, which might be made from a part of the same meat. Similarly, sewer-mud and the excreta call for the use of a stronger disinfecting material than, say, contaminated water or sweat. For, whereas, sewer-mud and excreta consist mainly of organic matters, and these largely solid, impure water and sweat contain but a relatively small proportion of organic solids liable to putrefactive change. Thus, sweat contains water as its chief ingredient, and only about 0.5 to 1.25 per cent. of solid constituents, and these consist to a considerable extent of inorganic salts. It is, therefore, evident that the various matters which require antisepting and disinfecting, present every degree of potency presented between solid or exclusively organic matters and dilute solutions, or films containing scarcely any solid organic substances.

My second proposition, then, is that, 'A disinfecting material for public use is not required of the same strength for all purposes; indeed, two or more forms differing in strength are desirable.'

Now, as matters of animal and vegetable origin are universally distributed, and find their way not merely into dust heaps and the sewers, but float about in the air, abound in waters, and even attach themselves to articles of wear and furniture, it is quite impracticable to universally prevent the process of putrefaction. That process cannot be initiated or perpetuated if the matters (otherwise of a nature to undergo this process) are in intimate contact with oxygen, for Pasteur, who is the greatest authority upon this subject, has established the fact that putrefaction cannot set up, say, for instance, in an extract of beef, until all oxygen which may be present in the fluid has been first removed and consumed by certain other ferments of a vegetable nature. But, it is easy to understand that a variety of circumstances continually exist under which oxygen is shut out from direct contact with putrefactive vibriones, and immediately this happens, putrefaction sets in. Thus, although by proper methods of cleanliness and ventilation, a house may be set in order, especially if measures of disinfection are also resorted to, yet, as it is not possible to be always using disinfectants or ventilating or cleansing, or rather, since generally speaking, these sanitary proceedings are not sufficiently borne in mind and practised, we meet from time to time with the process of putrefaction going on in our midst, and until very recent years this was specially the case in our hospitals. It is, therefore, necessary, not only that a disinfecting material should be able to prevent and arrest putrefaction, but it must also have the property of oxidising or otherwise destroying the poisons to which that process gives rise. Hence, my third proposition is: 'A disinfecting material should possess oxidising powers, so that it can destroy the products of putrefaction as well as prevent and arrest the process which creates them.'

Lastly, it is evident that to admit of universal application, a disinfectant must not merely possess those qualities which we have already studied, but it must also have such other qualities as fit it for universal use. In destroying septic poisons care must be taken that the remedy shall not of itself kill the people; and so also in disinfecting inhabited apartments, the disinfecting material must not be inflammable or corrosive, neither must it stain the linen, the carpets, and the furniture. All this is imperative; for if reliance be placed upon disinfectants which either poison or stain, that reliance will be misplaced, for such reagents cannot be used as they should be used without destruction to life and property. My last proposition, then, is: 'A disinfectant qualified for universal use must not be poisonous in itself, and must give no stain. In other words, it must be fit for universal application, and hence must not be destructive to life or property.'

I shall now proceed to show, by a description of experiments, which I have made for this purpose, that 'Sanitas', in the forms of fluid and powder, is the only preparation which is qualified in every sense for universal application. To be clear about this, let us here reproduce in a succinct form the essential properties of such an agent: 1. In one form or another it must be competent to prevent and arrest all degrees of putrefaction. 2. It must oxidise or destroy the products of putrefactive change. 3. It must not be poisonous, must not stain, and must not be corrosive or inflammable, etc.

Experiment I.—A piece of lean beef steak, about 3 inches square, was lightly rubbed over with 2 grammes of Sanitas powder. It was kept exposed to the air for thirteen days, and up to the end there was no putrefaction or other apparent change. It dried up sweet and good.

Experiment II.—The first experiment was repeated with the same quantity of powder, only in this case it was mixed with 5 cubic centimètres of water, and applied to the meat as a wash. Consequently, not nearly the whole of the 2 grammes were finally placed upon the meat. It was kept for twenty days without any kind of change, except that it dried up entirely.

Experiment III.—The first experiment was made also with the same quantity of 15 per cent. carbolic acid powder. The meat had a sour smell on the ninth day, and this odour persisted whilst the meat remained moist. Finally, it dried up.

Experiment IV.—Two ounces of flour were made into a paste, with 2 ounces of water. The paste was divided into halves; one half was well mixed with 1.63 grammes Sanitas powder, and the other with the same quantity of 15 per cent. carbolic acid

* Fungi have the property of absorbing oxygen by respiration, whereas putrefactive vibriones are killed by contact with oxygen (Pasteur).

powder. The mixtures were placed in test glasses, imperfectly covered with watch glasses. The Sanitas paste kept absolutely unchanged for fifteen days, then small tufts of a fungic growth appeared on the sides of the glass where the liquor had been drawn up by capillary attraction out of contact with the Sanitas powder. It did not otherwise alter during the subsequent twenty-three days, but the mixture remained as good as at first. From the carbolic paste a liquor separated, and this became gradually red. On the second day this was very distinct, and the colour gradually deepened to blood-red, a mouldy odour simultaneously developing, and the paste itself becoming discoloured to a considerable depth. These characters intensified during the thirty-eight days it was kept.

Experiment V.—The whites of nineteen eggs were diluted with water until the whole measured 1,200 cubic centimètres. Quantities of 80 cubic centimètres each were now measured out into so many stoppered bottles, and to each bottle a quantity of Sanitas or carbolic acid powder was now added, and the mixtures agitated from time to time. The quantities of powder used ranged from 0.1 gramme upwards. The albuminous solution containing 0.1 gramme Sanitas powder kept quite unchanged for seven days, but became faint on the eighth day. All the other Sanitas mixtures kept perfectly unchanged for the whole period they were observed, namely, forty days. The mixture containing 0.1 gramme carbolic acid powder became faint on the second day, and decidedly stank on the third day. The mixture containing twice this quantity of powder became faint on the fifth day, and stank badly on the sixth day. The mixture with 0.5 gramme became doubtful on the twelfth day, but in this case the carbolic smell was too powerful to be certain about the observation, although in the smaller amounts there was not the slightest doubt about the putrefactive odour and the presence of active vibriones. I specially examined the carbolic solutions in every case, and found that each one gave a precipitate on boiling, showing that in no case had all the albumen been coagulated by the carbolic acid.

Experiment VI.—A large piece of beef steak, weighing more than one pound, was left in contact with about half-a-pint of fluid extract of beef until the whole was very putrescent. Ten grammes of Sanitas powder were then added and the mixture agitated. In this way the putrescent odour was entirely destroyed, and only the smell of ammonia remained. The mixture was kept five days, and putrefaction did not recommence. This experiment was also made with rotten mackerel, with a like result.

Experiment VII.—A quantity of freshly voided urine was well mixed with some fresh fæces, and the mixture placed in a stoppered bottle of considerable capacity with a sprinkling of Sanitas powder. The mixture has now been kept for more than 200 days and is free from putrescence, and the life which causes it.

Before describing any further experiments, I submit that those already given, prove that Sanitas powder is, weight for weight, more active in preventing putrefaction than 15 per cent. carbolic acid powder, and that it will do what carbolic acid powder will not do, viz., destroy the poisonous products of putrefaction, when these have been allowed previously to form. It is also proved that Sanitas powder is competent, when present in very small quantity to entirely prevent and arrest the process of putrefaction, even when circumstances, otherwise, are most favourable to putrefaction. In illustration of the deodorising powers of Sanitas powder, I need mention only one fact. The recent Smithfield Club show, where there were hundreds of animals, including more than fifty pigs, not to speak of the huge attendance of visitors, was deodorised by Sanitas powder and fluid so effectually, that even the presence of the pigs could not be detected by their characteristic odour. Sanitas powder not only prohibits and arrests the action of germ life, but it rapidly exerts an alterative effect on bioplastic substance generally, and has the advantage of giving off antiseptic and oxidising vapours. I, therefore, submit that for disinfecting urinals, public markets and other places, sewer-mud, cesspools, streets, etc., there is no agent which can be used with such unmitigated good effect as Sanitas powder. Moreover, its price compares favourably with that of other powders.

Experiment VIII.—A large piece of fresh, lean beef-steak was cut up into pieces of more than 1 inch square; each piece was threaded with cotton, and then suspended in bottles containing 96 cubic centimètres of differently constituted solutions, composed of Sanitas and water, in the propositions given below.

Solution used.			Remarks.
Pure Sanitas No. 2			The meat kept perfectly good as long as observed (in this case 50 days, but in other instances as long as 365 days).
Sanitas.	Water.		
7 parts	1	..	Kept absolutely unchanged so long as kept.
6 ,,	2	..	The same.
5 ,,	3	..	Kept quite free from putrescence for 40 days.
2 ,,	6	..	,, ,, ,, 13 ,,
Pure water			Began to stink on second day and each day grew worse.

Even a 10 per cent. solution of No. 2 Sanitas retards to a considerable extent the process of putrefaction, and if, then, the mixture be kept for many weeks, although the solution will smell badly, the meat itself will be seen to have suffered little or no change, and, so far as I have observed in many experiments, will dry up on exposure to the air without further putrefaction. It seems that in the first stages of the immersion the meat is so influenced by the Sanitas that, while the extractive part which passes into solution subsequently purifies, it (the meat) is protected against such change. It presents a par-boiled, healthy appearance and is hard. In the stronger Sanitas solutions the meat presents the same par-boiled look, and remains perfectly hard and sweet, while the solutions themselves also remain brilliant and good. The set of experiments just described were performed in vessels only loosely covered.

Experiment IX.—Two pounds of fresh beef-steak were minced and extracted at 60° centigrade, with 720 cubic centimètres water. The extract was cooled, filtered from fatty matter, and equal quantities placed in stoppered bottles with the quantities of Sanitas, No. 2 fluid, shown below.

Mixture.			When a putrid odour was observable.
Extract.	Water.	Sanitas.	
50 parts	50	0 ..	Faint on the second day, very red and putrid on fourth day.
50 ,,	25	25 ..	Faint on thirtieth day; advanced very slowly.
50 ,,	12.5	37.5 ..	Good so long as kept—viz., forty-two days.
50 ,,	0	50 ..	The same, of course.

I have made many other experiments of this kind, all confirmative of the same general results. The beef extracts are considerably bleached by the peroxide of hydrogen in the Sanitas, but, generally speaking, the putridity, when it sets in, is coincident with more or less reappearance of the red colour, and the forma-

tion of a turbidity, which gradually grows into a deposit. Meat which has been preserved in Sanitas solution dries up unchanged on exposure to the air.

Experiment X.—This experiment is given in illustration of the power which Sanitas exerts in retarding fermentation, considered as a phenomenon apart from putrefaction.* A quarter of an ounce of flour made into paste with 10 cubic centimètres water, began to ferment distinctly on the third day; mould was beginning to form, and the distinctive odour attending fermentation of this kind was plainly perceptible. On the eighth day, the mould appeared through the surface, and the fluid-layer at the top had become yellow, and of very bad smell. A similar paste made with 10 cubic centimètres of Sanitas, No. 2, instead of with water, remained absolutely unaltered for nine days. Then, a little white fungus formed in the solution and grew slowly (not so rapidly as in the water paste). A paste made with 20 cubic centimètres of the same Sanitas remained quite intact for seventeen days, that is up to the time of writing. The vessels were only partially protected from the introduction of particles from without.

Experiment XI.—Pieces of fresh, lean beef, each 2 inches square, and ½ inch thick, were immersed for two hours in the solutions given below, and then freely suspended in the air in a room kept at 60° Fahrenheit by day, but not heated by night (November).

Cubic cntmtrs. Solution used.	Remarks.
100 of pure water	Solution became red and stank on third day, with turbidity.
100 of 10 % Sanitas No. 2.	All these solutions remained free from red colour, turbidity, and smell so long as observed—viz., twelve days.
100 of 50 % ,, .	
100 of pure Sanitas	
100 of 1 % Carbolic acid ..	Became red; turbid on second day; turbidity increased each day.

All the pieces of meat dried up, free from any trace of putrefactive change, so that the object of the experiment was partially defeated. However, the history of the solutions affords some interesting information.

Experiment XII.—A large beef-steak was cut up into a nnmber of pieces of 1 inch square every way. These were threaded, kept moistened, and allowed to pass into advanced putrefaction. They were then suspended in solutions of 100 cubic centimètres, and containing respectively, 12.5, 25, 37.5, 50, 62.5, 75, 87.5, 100 per cent. Sanitas, No. 2 Fluid. To check the results one piece was suspended in water. This latter solution at once became red, and the putrefaction advanced daily; the meat gradually softening, becoming very red, and decreasing in volume and weight as it decomposed. The solution containing 12.5 per cent. Sanitas blanched the meat, and removed the putrid odour. This, however, returned on the fifth day after, and the solution reddened again slowly. In all the other cases, the putrefaction was at once arrested and destroyed, and did not recommence during the twenty-seven days that the experiment was kept going. The pieces of meat presented at the end of this time the blanched, par-boiled appearance previously referred to. They were all perfectly sweet, and on exposure to the air dried up entirely free from decomposition. A similar experiment was made with pieces of mackerel, with the same general results, but the fishy smell prevented attainment of equally precise results.

Experiment XIII.—A strong fluid extract of beef was kept during four weeks in a warm room, until in fact it became terribly putrid. Quantities of this were placed in stoppered bottles, and then to these quantities, Sanitas, No. 2, solution was added from a burette, until in each case the putrefactive odour could be no longer observed after shaking. In this way it was ascertained that 30 cubic centimètres of the Sanitas fluid entirely deodorised 100 cubic centimètres of the putrid extract, thus confirming a property of Sanitas referred to previously.

I submit these latter experiments as clearly establishing the facts that Sanitas, No. 2, even when diluted, say, with eight or ten times its bulk of water, is sufficiently powerful to prevent and arrest such putrefactive change as can ever be expected to occur upon the human body, or in inhabited apartments; and that when used in a less diluted or a pure state, its capacity for work increases accordingly.

These, and many other experiments, which I could adduce if desirable, only confirm the general result which has been arrived at by many of the chief Boards of Health, Hospital Authorities, Medical Officers, and Surgeons, both in this country and abroad, which is, that Sanitas, in the shape of powder and fluid, constitutes an economical and effective antiseptic, disinfectant, air purifier, and deodoriser. Finally, it alone, of all fluid disinfectants, is perfectly non-poisonous, stainless, and without corrosive properties. On the other hand, indeed, it is pleasantly aromatic in character, and is qualified for universal application. The use of Sanitas for diffusing into the atmosphere of inhabited apartments and sick rooms, presents one really great advantage: it easily parts with oxygen, and it thus atones somewhat for that which is used up in insanitary processes. Then, as to cost, it must be remembered that poisonous disinfectants, and those which stain, become costly if the injury which is inflicted by using them in the only way that is effective, viz., abundantly, be also taken into account when determining their comparative values. Moreover, some real value must be placed, apart from all other considerations, upon a reagent which suits the public taste and convenience. As regards the composition of Sanitas powder and fluid, there is no occasion for any remarks in this place, the facts being, I apprehend, sufficiently well known.

In conclusion, I am anxious to point out that this paper is not intended to pass the various disinfectants now before the public under any comparative review. As far as possible I would rather avoid such comparisons than institute them, entertaining the conviction that it is almost impossible for any two persons to agree upon a basis of comparison. Each has its merits, and with these the consumer may easily acquaint himself, and act according to his requirements.

* In the immediate vicinity of the room in which this experiment was conducted, hay and straw were being continually handled. This would, of course, favour the institution of fermentation in the pastes. It is interesting to bear in mind that so far as one constituent of Sanitas is concerned, namely, peroxide of hydrogen, this might be considered to aid the development of fungi, seeing these respire, taking in oxygen and giving out carbonic anhydride, but I do not know how far this is the case. Anyhow, the camphoraceous constituents of the Sanitas overpowers this tendency if it exists. Elsewhere I have substantiated the fact that peroxide of hydrogen exhibits remarkable antiseptic effects.

Two neighbours had a long and envenomed litigation about a small spring which they both claimed. The judge, wearied out with the case, at last said, 'What is the use of making so much fuss about a little water?' 'Your honour will see the use of it,' replied one of the lawyers, 'when I inform you that the parties are both milkmen.'

THE WORKING OF THE 'CANAL BOATS ACT, 1877.'

A YEAR has now barely passed since the above Act came actually into effect, and various conflicting statements have during that period appeared from time to time in some of the daily papers respecting its working. The number of canal boats employed in our inland navigation is, according to Government returns, about 5,000, and their population 18,421. A majority of the boats, indeed, we believe, all belonging to the large owners, are by this time registered; but few of those whose masters are also proprietors. Great difficulties are experienced by many local authorities in enforcing registration of the latter class, and still more in preventing subsequent non-compliance with the Bill, both as to overcrowding and want of school attendance. Some unfounded charges of 'apathy', 'culpable indifference', etc., have been made against them, and the total quantity of boats and boaters has been greatly overstated. Whilst giving all due credit to the originators and promoters of this measure for their philanthropy, energy, and administrative ability, we cannot characterise it as a complete success, and will point out certain defects, which we hope, before long, to see remedied. These exist both in the Act itself and in the regulations of the Local Government Board made in pursuance of it; but the most important faults are found in the former. It is, in a word, simply permissive, and not compulsory, and will, until amended (as lately pointed out by a correspondent of the *Times*) 'remain a dead letter' in many instances, however painstaking the officers engaged in carrying it out may be.

Take, for example, the statement of the superintending officials (all, by the way, medical officers of health) of the three Metropolitan Registration Authorities. Few boats have been registered in their districts, the reason being that none of these craft hail from Limehouse and Rotherhithe, and but a small number from Paddington; so that, although several instances of non-compliance with the law were noticed by these gentlemen, they could rarely, if ever, follow up the defaulters, who, for want of 'power for detention', were away to some unknown locality long before a summons could be either served or heard. It has been argued that the 'alleged offenders' can be prosecuted on a future occasion, either on their return, or in any place where they, 'for the time being, are', but it is obvious that they may not, and as a fact do not often return, and also that an authority in London cannot well permit its officers to appear before, say Bristol, Manchester, or even Doncaster justices.

We believe that the Metropolitan inspectors allow no boat to enter the waters without endeavouring to effect its registration. Yet it was lately officially reported by one of them that out of 498 boats observed, two only had registered under his jurisdiction, and 30 which had come and gone, although found to be in contravention of the Act, could neither be prosecuted there or elsewhere—in each case the 'master's whereabouts' was not discoverable; the owner, on being urged by letter to register, replied that he was not 'in fault', as he had elsewhere given notice of his intention to do so.

Another and probably the greatest obstacle to the satisfactory working of the Act is caused by the fact that when a boat is registered, any children living on board come under the domination of the School Board of the district wherein registration is effected; and to a person conversant with the ideas and feelings of waterside characters, this alone is sufficient to prove that the Act, as at present drafted, must be a failure. So long as women with children are allowed to live on board, so long will various contraventions of the Act occur, even after registration has been accomplished. As all the reasons which rendered legislation imperative for canal boats, as defined under the Act, apply almost, if not quite, equally to sailing barges, we are at a loss to see why the latter vessels should be exempt from its operation. We consider that alterations somewhat like the following would greatly improve its efficiency.

40 and 41 Victoria, c. 60.—Section 1, after words, 'owner of a canal boat', add 'shall'; after words, 'owner of the boat', *dele* 'if he be in fault'; after words, 'shall each', add 'or either of them'. Section 5, after word, 'necessary', add 'or for obtaining and serving a summons, if requisite'. Section 7, after words, 'having a district', *dele*, 'rest of sentence', add, 'in which its owner resides or has offices'. Section 14, after word, 'means', add, 'any sailing barge, and also'. Regulations of Local Government Board, March 20, 1878. Regulation III., for 'twelve years', read 'three years' in every case. Regulations of Local Government Board, May 17, 1878. Regulation V.—Draw this so as to make every Sanitary Authority abutting on a canal the Registration Authority for that part of the canal forming its foreshore.

If these are carried out even its most enthusiastic advocates will be relieved from the necessity of manipulating statistics, and, 'having no case, of abusing the plaintiff's attorney'. Space will not now permit us to demonstrate the advisability of the proposed emendations; but we hope to resume this subject on another occasion.

A DIFFICULTY IN WATER-SUPPLY.*

By THOMAS BRITTON, M.D., Sanit. Sci. Certif. Camb. 1879.

Medical Officer of Health, Halifax Rural and Combined Districts.

I BRING before you to-day a question upon a subject of immense importance, not only to officers of health but to the public generally. It does not, however, directly affect those who are living in large towns, where a regular system of water-supply is provided, but it affects in a more or less degree those living in rural sanitary districts, and in the more thinly populated portions of urban districts, and more especially hilly districts. It is the important question of purity of water-supply. Let me bring before you a typical case of the pollution of a water-supply. Imagine yourselves standing near the top of a hill from which a splendid spring of water is issuing, and follow me in tracing that spring to the bottom of the hill, and noticing to what purposes it is used on the way. It issues from the side of the hill near the top, and runs in an open drain or watercourse on the surface of the ground until it arrives at a farm house. It is here conducted into a stone trough from which the cattle drink and the family obtain their water-supply. The overflow from this trough is carried in an open gutter through the yard. From this trough is also carried a leaden pipe to the top end of the mistal in which a number of cows are kept. The farmer daily sets the water from this pipe running and swills out the mistal, the contents being discharged into the

*Read before the Society of Yorkshire Medical Officers of Health.

open gutter in the yard which takes the overflow from the trough. It is also so arranged that the drainage from the pigsties empties itself into the same gutter, as does the sink-pipe from the house, washhouse, etc., This watercourse (if I may so term it), but which has now become a drain for sewage, is carried on to the land in which the farmer cuts grips or channels for the purpose of irrigating the grass. It passes onwards and downwards until it is again impounded in a stone trough at a block of cottages, where it is used for domestic purposes, the overflow being again utilised for conveying the nightsoil and sewage on to the land below. It passes again in the same way, and is again impounded in another stone trough for the benefit of the inhabitants of a second block of cottages, and so on, until it reaches the bottom of the hill and is discharged into the river or stream.

Now we will suppose that A. is the owner of the farm, B. of the first block of cottages, and C. of the second block, and that in the cottages occupied by C.'s tenants there has been an outbreak of fever which the medical officer of health has reported as being produced or aggravated by the contaminated water-supply.

What is the Sanitary Authority to do? What powers do Rural and Urban Sanitary Authorities possess by which they can remedy this serious state of affairs? Let us look what the law can do for us, and in the first place see what powers the Public Health Act (1875) gives us for the protection of water. We will first read Section 69:—

'PUBLIC HEALTH ACT, 1875. Section 69.—Any local authority, with the sanction of the Attorney-General, may, either in their own name or in the name of any other person, with the consent of such person, take such proceedings by indictment, bill in Chancery, action, or otherwise, as they may deem advisable for the purpose of protecting any watercourse within their jurisdiction from pollutions arising from sewage either within or without their district; and the costs of and incidental to any such proceedings, including any costs that may be awarded to the defendant, shall be deemed to be expenses properly incurred by such authority in the execution of this Act.'

Will this stream come under the term 'watercourse' as used in this section, and if it does, will any Sanitary Authority adopt this section with its tedious and expensive mode of action, in order to protect a private water-supply? I fancy not. So we will pass on to Section 70, which runs as follows:—

'On the representation of any person to any local authority that within their district the water in any well, tank, or cistern, public or private, or supplied from any public pump, and used or likely to be used by man for drinking or domestic purposes, or for manufacturing drinks for the use of man, is so polluted as to be injurious to health, such authority may apply to a court of summary jurisdiction for an order to remedy the same; and thereupon such court shall summon the owner or occupier of the premises to which the well, tank, or cistern belongs, if it be private, and in the case of a public well, tank, cistern, or pump, any person alleged in the application to be interested in the same; and may either dismiss the application or may make an order directing the well, tank, cistern, or pump to be permanently or temporarily closed, or the water to be used for certain purposes only, or such order as may appear to them to be requisite to prevent injury to the health of persons drinking the water.'

Closing the well certainly will not answer our purpose, as the inhabitants have only that supply available, and if the magistrates order the water to be used for 'certain purposes only' they have no guarantee that it will be so used, but the contrary. Have the magistrates only power to close the wells under this section, or does the expression 'or such other order as may appear to them to be requisite to prevent injury to the health of the persons drinking the water' mean that they may, if so disposed, order the water to be so piped as to prevent its being fouled, or the sewage so piped as to prevent it fouling the water? If so, on whom can they make the order? and will the order allow the party or authority obtaining it to go on anybody's land to remedy the defect, or will he and they be liable for trespass?

What does the Rivers' Pollution Act say, and will it avail us? I will read Section 3:—

'Every person who causes to fall or flow, or knowingly permits to fall or flow, or to be carried into any stream any solid or liquid sewage matter, shall (subject, as in this Act mentioned), be deemed to have committed an offence against this Act. Where any sewage matter falls or flows, or is carried into any stream along a channel used, constructed, or in process of construction at the date of the passing of this Act, for the purpose of conveying such sewage matter, the person causing, or knowingly permitting the sewage matter so to fall or flow, or to be carried, shall not be deemed to have committed an offence against this Act, if he shows, to the satisfaction of the Court having cognisance of the case, that he is using the best practicable and available means to render harmless the sewage matter so falling or flowing, or carried into the stream.'

What is the meaning of stream in this Act? The farmer will claim that he has the right to use the water for irrigation purposes, that this right has been exercised from time immemorial! and that the owner below has only the right to the tail of the water after he has done with it, and that he is not bound to deliver it pure to him; and further, that irrigation is really the best practicable and available means of rendering harmless the sewage water so falling, or flowing, or carried into the stream. This argument is very fallacious, as regards rendering the sewage harmless, because, the water running in a good stream carries the sewage along the grips cut in the land in almost an uninterrupted course, into the stone trough below; only a small portion being really taken up by the land through which it passes. I think we shall not get much redress from this Act of Parliament, so let us try the new Act brought in by Mr. Brown, and entitled, 'The Public Health (Water) Act, 1878'. This Act applies to Rural Sanitary Authorities, but Section 11 gives Urban Authorities a means by which they can obtain the same powers, viz., by application to the Local Government Board. Prior to this Act being brought before Parliament, Mr. Brown kindly sent me a copy, and requested me to make any suggestions which I thought might be useful, but I did not then see the difficulty which now faces us, and therefore did not bring the matter before him. On looking at Section 3, I thought it would deal with such cases as I have named, but it seems that such is not the case. There is one important omission which, in many cases, invalidates the whole Act, and that is, 'no power is given to Sanitary Authorities to go into one owner's land to lay pipes, in order to provide a pure water-supply for another owner's houses'. I will read you the sections:—

'PUBLIC HEALTH (WATER) ACT, 1878.' SECTION 3.—It shall be the duty of every Rural Sanitary Authority, regard being had to the provisions in this Act contained, to see that every occupied dwelling house within their district has, within a reasonable distance, an available supply of wholesome water, sufficient for the consumption and use for domestic purposes of the inmates of the house.

'Where it appears to a Rural Sanitary Authority, on the report of their inspector of nuisances, or their medical officer of health, that any occupied dwelling-house within their district has not such supply within a reasonable distance, and the Authority are of opinion that such supply can be provided at a reasonable cost not exceeding a capital sum, the interest on which, at the rate of five per centum per annum, would amount to twopence per week, or at such other cost not exceeding a capital sum, the interest on which, at the rate of five per centum per annum would amount to threepence per week, as the Local Government Board may, on the application of the Local Authority determine, under all the circumstances of the case, to be reasonable, and that the expense of providing the supply ought to be paid by the owner, or defrayed as private improvement expenses, proceedings may be taken as follows:—*Sub-Section* 3.—If, at the expiration of one month from the date of the service of the second notice, the requirements of the first notice are not complied with, the Authority may, subject as in this Act is mentioned, themselves provide the supply, and for that purpose they may enter upon the premises, and execute all such works as appear to them necessary for obtaining a supply of water for the house; and for the purposes of such entry, sections 102 and 103 of the Public Health Act, 1875, shall apply until the works are completed, in the same manner as if an order of a court of summary jurisdiction had been made for the abatement of a nuisance on the premises, and that order had not been complied with.'

Let us refer again to the case named, and see how the Act will work. Upon the report of the medical officer of health that fever has been caused in C.'s houses by contaminated water-supply, the Sanitary Authority send a notice to C., under section 3 of this Act, to provide his houses with a pure supply of water, knowing that this can be supplied at a cost not exceeding a capital sum, the interest on which, at the rate of five per centum per annum, would not amount to more than twopence per week for such house. In answer to this notice, C. says:—'I am perfectly willing to carry out your requirements, but B. will not allow me to pipe any water from his stone trough; and even if he did, the water is previously contaminated by A., and he will neither allow B. nor myself to pipe through his land.' What can the Sanitary Authority do now? Will any of the three Acts of Parliament enable the occupants of C.'s cottage to obtain a pure supply of water? I am afraid not; and therefore beg to read a clause which has been prepared by a legal friend of mine, which, I think, would enable Sanitary Authorities to deal thoroughly with the question I have propounded to you. It is as follows:—'And be it enacted that where, upon the report of a medical officer of health, that the water-supply of any house, or of any well, trough, or place for the use of cattle, is polluted or fouled, or likely to be polluted or fouled, or rendered unfit for domestic use, or for the use of cattle, in consequence of such water-supply running from one place to another in an open or covered drain, the Local Authority of the district in which such open or covered drain is, or the Local Authority of the adjoining district, may, by notice in writing to the tenant, occupier, or owner of the lands or premises through which such water-supply runs as aforesaid, require the tenant, occupier, or owner to convey the said water-supply through such lands and premises, in earthenware or metal pipes, of such diameter, and in such manner, and for such distance, and within such time as the said Local Authority giving the notice, by their said notice shall describe and fix. And if the said tenant, occupier, or owner, shall fail to do the work by the said notice required to be done, or any part thereof, within the time mentioned in the said notice, the Local Authority giving the notice may, by an order in writing, direct their Surveyor, and such workmen as he may require for the purpose, to enter the said lands and premises through which such water-supply runs, and to do the work required by the said notice to be done; and the expense thereof shall be recoverable from the tenant, occupier, or owner in a summary manner, or by an order of the said Local Authority giving the notice, the same expenses may be declared private improvement expenses, and can be recoverable as such by the Local Authority giving the said notice.

THE

SANITARY RECORD.

JANUARY 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE PAST AND FUTURE OF THE REGISTRAR-GENERAL'S OFFICE.

SINCE the publication of our last issue, the expected resignation of Major Graham as Registrar-General has become an accomplished fact, and a new Registrar-General has been appointed in the person of Sir Brydges Henniker, Bart., late private secretary to the President of the Local Government Board. It was very generally known that Dr. Farr, who had so efficiently filled the post of Superintendent of the Statistical Department of the office for more than forty years, became a candidate for the appointment of Registrar-General when Major Graham some time since announced his intention to resign at the close of the year. It will scarcely have surprised anyone to hear that Dr. Farr, on learning of the appointment of Sir Brydges, and of his own disappointment, decided to tender his resignation. Unfortunately, therefore, the Registrar-General's Department, which has during the past forty years exercised so beneficial an effect upon sanitary progress, has been at once deprived of the services both of Major Graham and Dr. Farr. Of Sir Brydges Henniker's qualifications for the appointment he has obtained nothing is at present known, and it remains to be

seen what measures will be taken to provide for the duties which Dr. Farr may be said to have created, and which he had so long discharged with such brilliant success.

The future of the Registrar-General's Department is, therefore, clouded by doubt, which is not lessened by the very general impression that the relations between that department and the Local Government Board are destined to become more intimate. That the General Register Officer, as the fountain head of vital statistics, should be closely connected with, and indeed form part of, a real Public Health Department, no one will question. The Medical Department of the Local Government Board, however, tied and bound as it is by Poor-law tradition and influence, is but the shadow of a Central Health Department, and it is impossible to view with satisfaction the recent changes which portend a loss of that independence of the General Register Office to which much of its influence on public opinion in the direction of health progress has undoubtedly been due.

It is difficult to speak too highly of the success which has marked Major Graham's reign at the General Register Office. He has held the appointment of Registrar-General since 1842, when civil registration was in its infancy, and by his undoubted business capacity and power of organisation, has contributed much to the marked improvement in registration which has steadily taken place since that date. It would be useless now to regret his steady opposition to many reforms in the system and details of registration, which have from time to time been pressed upon the attention of government by those who are anxious to make registration still more helpful than it has hitherto been to sanitary progress. Major Graham, by his recent re-issue of his evidence given before the Royal Sanitary Commission in July 1869, has shown that he has seen no reason to change the opinions which he then so forcibly expressed. We have no sympathy with those opinions, and we wish that he had allowed us to forget that he had ever expressed them. We hope yet to see the three proposals to which he so strongly objected carried into effect. They were, the national registration of disease, the registration of still-births, and a reform in the procedure of coroners which shall provide for some scientific investigation of the causes of all uncertified deaths. We could not wish that Sir Brydges Henniker should prove a better man of business than Major Graham; but we may venture to hope that he will be more mindful than his predecessor of the public health aspect of registration.

Dr. Farr, after his more than forty years of arduous labour, is no longer young; he is indeed older than his mere age would suggest, and it is no secret that the state of his health has recently warned him that he wants the rest he has so fully earned. He was willing, however, and indeed anxious, to be appointed and to hold the office of Registrar-General for a short time, in order to be able to carry out reforms which had been impossible while Major Graham held office; he was also willing to take his share in the labour of organising the next census enumeration, which must now be left in new hands. The Government took upon themselves to decide the question by appointing Sir Brydges Henniker instead of Dr. Farr, as Registrar-General, and those who have Dr. Farr's personal welfare at heart will scarcely regret that this appointment led to Dr. Farr's resignation. The loss to the public service, and especially the circumstances which led to it are, however, to be deeply deplored. The successive appointments of Dr. Burke and Dr. Grimshaw to the Registrar-Generalship of Ireland, renders it the more unaccountable that the far stronger claims of Dr. Farr to be Registrar-General of England should have been passed over in silence. We are willing to credit the Government with the intention of repairing, as far as lies in their power, the apparent slight upon so eminent a public servant as Dr. Farr. It can scarcely be doubted that Dr. Farr's request to be allowed to retire upon full pay after his more than forty years' service will be readily granted; but, beyond this, some distinguishing mark of appreciation of his exceptional services is urgently called for, and we hesitate to believe that it can be withheld.

To detail Dr. Farr's claims to the gratitude of those interested in public health progress, would be to write the history of sanitation during the past forty-five years, which is here out of the question. In 1838 Dr. Farr was selected to utilise the statistical facts recorded in the National Registers of Marriages, Births, and Deaths, and in his First Annual Report, the Registrar-General (at that time Mr. Lister) recorded that Dr. Farr's 'scientific knowledge and intimate acquaintance with statistical inquiries were ample pledges of his practical fitness'. How fully Mr. Lister's anticipations have been fulfilled it is needless here to say. Each of the forty published annual reports of the Registrar-General, to say nothing of the continuous succession of weekly and quarterly returns, afford ample testimony of the untiring energy of Dr. Farr, and of the vast amount of original and laborious work he has contributed during his long service. It is seriously to be regretted that so much of his work, which forms almost the basis of the science of vital statistics, should be buried in these official reports, which are for the most part out of print, and thus beyond the reach of those who would gladly study them.

Major Graham, in the closing paragraph of the fortieth annual report, published in May last, referred to his and the public's obligations to Dr. Farr, in the following words:—'Lastly, I must express to Dr. Farr, whom in 1842 I had the good fortune to find presiding over the Statistical Branch, my grateful acknowledgments of the statistical services he has ever since continually rendered. He is acknowledged throughout Europe, the United States, East Indies, and the Colonies, as one of the first statists of the day. To his scientific researches and reports I attribute any reputation that may have accrued to

the General Register Office of England and Wales from the time he accepted office in this department.' It is indeed difficult to account for the neglect of the Government to recognise the claims of Dr. Farr, which are thus so generously acknowledged by Major Graham, under whom he served for nearly forty years.

In addition to the work more intimately connected with Dr. Farr's routine work in the General Register Office, he contributed many special reports of exceptional value, among which may be noted those upon the two cholera epidemics of 1849 and 1866; the English Life Tables, Nos. 1, 2, and 3; the Healthy District Life Table, and two supplemental reports upon the vital statistics of the two decades, 1851-60 and 1861-70. He, moreover, constructed, and from time to time improved, the system of nosological classification, which has not only been adopted in the Registrar-General's reports, but by nearly all who write upon mortality statistics at home and abroad. During more than forty years he has frequently contributed valuable papers, mainly dealing with different branches of vital statistics, to the journals of the Royal Society, the Statistical Society, the British and British Medical Associations, and the Social Science Association. Dr. Farr was an Assistant Census Commissioner, and contributed valuable assistance at the three enumerations in 1851, 1861, and 1871, including a system of classification for occupations; he also wrote most of these three census reports. He was continually consulted by the Government, for the time being, on sanitary and actuarial subjects, and was examined by or otherwise contributed information to numberless Royal Commissions. He, in conjunction with Lord Stanley, Lord Herbert, Sir Ranald Martin, and Dr. Sutherland, formed a Commission, and reported upon Army Medical Statistics, and on the Health of the Army in India. He was mainly instrumental in the establishment of the system of Post Office Insurance, for which his English Life Table was accepted as the basis, and for which he in fact served as actuary. Such is a mere outline sketch of Dr. Farr's statistical work during the past half century. He was also appointed by Government to represent the United Kingdom at the several International Statistical Congresses which have been held since their inauguration in 1851.

It will scarcely be questioned that Dr. Farr has done more than any one else, dead or alive, towards the creation and development of the science of vital statistics in England, and that it is entirely due to his talents and to his untiring industry that England has recently taken, internationally, so completely the lead in this branch of knowledge. The reports and returns of the Registrar-General, originated and superintended by Dr. Farr, have been generally accepted as models for such reports in all parts of the civilised world.

That the Government has thought fit to appoint Mr. Sclater-Booth's private secretary as Registrar-General, and to disregard Dr. Farr's request to succeed Major Graham, is a disgrace to our system of patronage disposal. It, however, only now remains to urge upon the Government some generous, though tardy, acknowledgment of the exceptional value of his services. Dr. Farr has simply asked to be allowed to retire on full pay. The public, however, and especially that portion of the public which feels the deepest interest in public health matters, will not be satisfied unless some special honour marks the recognition on the part of the Government of what is due as much to themselves as to Dr. Farr. Failing this, which we scarcely like even to suggest, we doubt not that the public will take the matter into their own hands, and in some effectual manner mark their appreciation of his services.

SANITARY REVIEW OF 1879.

AT the opening of the New Year, there may be some advantage in our giving a retrospect of the sanitary events which characterised the year that has just been concluded; and in doing so we may be allowed a word of preface as to ourselves. During 1879 an important change took place in the form in which this journal is published. The result has been such as to show that in making this alteration we were consulting the preference of a large majority of our readers: and, for the reasons given in former issues, it is hoped that the greater permanency and weight of a monthly periodical will make the change a very beneficial one. Our columns have contained, during the last twelve months, a large number of selected original papers by gentlemen of experience on various points of practical and scientific interest; and this series of papers we shall continue during the present year. Mr. Eassie's valuable 'Dictionary of Sanitary Appliances' has proved to be of immense service in bringing together in one focus all the various appliances designed for particular purposes, and in indicating the faults or merits of each. This dictionary we shall also continue. In addition to numerous special papers by experts on topics of the day, we have issued two Commissions for inquiry into the sanitary state of particular places, one of which (that at the Isle of Man) drew the attention of the Manx population to a subject on which they had before been criminally indifferent. In addition to other improvements, we have commenced a section for 'Notes on Epidemics', which we are assured will be of much value, and to which we invite the contributions of our subscribers. We have, moreover, in progress a series of reports on the combined sanitary districts of England and Wales, designed to assist in the inquiry which must inevitably be shortly made, as to the whole of the circumstances and working of these districts. As to the quality of our work, that must speak for itself: but we may take this opportunity of saying that the strenuous vigilance, independence, and the carefulness which has characterised this journal in the past, will be devoted, during the coming year, to maintaining the

high reputation which we are happy to know that it has attained amongst scientific journals.

Of the sanitary legislation of the year we have already spoken. Whilst there is much in the measures that have been passed that deserves approval, the present fashion of piecemeal and half-hearted legislation cannot be too strongly deprecated. The principle that half a loaf is better than no bread has its recognised advantages, but the danger lurks behind it, that we shall have to be permanently content with the half-loaf, notwithstanding the difficulties of eking it out. On several of the subjects touched by the recent Acts, thoughtful and thorough legislation is required, and until this can be enforced, it would seem well to suspend the present process of desultory patching year by year. It is gratifying to record the marked increase in the number of local authorities who have made statutory provision for the compulsory notification of cases of infectious disease occurring within their districts. Huddersfield, Bolton, Greenock, Burton-on-Trent, Nottingham, and Jarrow had already taken the lead in this direction, and last session, nine other towns—Llandudno, Warrington, Blackpool, Norwich, Blackburn, Rotherham, Leicester, Derby, and Edinburgh, inserted clauses in their local Acts having a similar object. The manner in which the notification is to be made is in some of the Acts susceptible of considerable improvement, and it would seem to be time that some official decision should be arrived at as to the principles which should govern this question. In this respect, the views at which the Parliamentary Bills Committee of the British Medical Association have arrived after much careful thought, that the proper person to give the information should, in the first instance, be the occupier of the house, the certificate of the medical attendant being given to him for transmission to the Sanitary Authority, merit particular attention.

Quite at the end of the last session of Parliament, an important statement was made by Mr. Cross on behalf of the Government, on the occasion of Mr. Fawcett's bringing forward a motion that the question of the London water-supply was a subject which ought, without further delay, to be dealt with by the Government. In a speech of singular force and moderation, Mr. Fawcett showed the great need for improvement in the present state of things: and after Mr. Sclater-Booth had delivered one of his sedative speeches, showing that everything was as it should be, Mr. Cross rose and said that he was quite alive to the evils of the present water-supply, and was not afraid of the difficulties attending its improvement. He promised that the subject should be fully looked into in all its bearings before next session, in order to ascertain whether the water-supply of the Metropolis could be improved without any material increase in the cost, and whether it would be necessary to call on the companies to surrender their powers into the hands of some central body appointed by the Government. Negotiations, we believe, are now in progress on behalf of the Government, with the object of buying up the interests of the Metropolitan Water Companies. Other sanitary questions which received more or less attention in Parliament were the Plague, Noxious Gases, Rivers' Conservancy, and County Boards; but with regard to none of these did the debates have any definite result.

The insanitary condition of Dublin, which some three years ago was the subject of lengthened report by our Sanitary Commissioner, has at length aroused the attention of the Irish Government; and accordingly a Commission, consisting of Mr. Robert Rawlinson, C.B., and Dr. McCabe, of the Irish Local Government Board, has been issued for the purpose of inquiring into the subject. In the course of the sittings of the Commission, the accuracy of our Commissioner's description of the place was fully borne out, and the high compliment was paid to him and to this journal, of receiving as evidence his reports—the Reports on the Sanitary State of Dublin, which appeared in the seventh volume of the SANITARY RECORD. The report of the Commission has not yet been published; but there is hope that the Government will at last be induced to take up the question of the improvement of the Irish capital in a thorough and complete manner.

The important subject of animal vaccination, which has now lain dormant in England for several years, was revived last Session by the introduction into the House of Commons, by Dr. Cameron, of a Bill providing for the supply by the State of animal lymph, for the vaccination of children whose parents have conscientious objections to the humanised lymph now used at all our public vaccination stations. The subject attracted the special attention of the Parliamentary Bills Committee of the British Medical Association, whose chairman paid in the course of last autumn visits to several of the animal vaccination stations on the Continent, with the view of examining their working, and of considering whether the system there in force could not be adopted in England. As the result of these inspections, and of the study of the recent literature and reports on the subject of animal vaccination throughout the world, Mr. Hart came to the conclusion that the improvements in the working of the method warranted the reopening of the question in England; and accordingly, with the sanction of the Committee, he arranged for a public conference of medical men on the subject which was held on the 4th, 18th, and 31st ult. at the rooms of the Medical Society. Previous to the meeting of the Conference Mr. Hart published a detailed report, which he had prepared in anticipation of it, going at length into the early history and subsequent wide development of animal vaccination, combating the objections against its use, and suggesting a course of future action. In this report, which summarised the whole of the recent European, Indian, and American literature on the subject, he showed that animal vaccination had made immense strides in public

estimation abroad, and he argued that the objections raised against it by Dr. Seaton, after an inquiry made on behalf of the Government in 1869, were now no longer tenable. Statistics were given showing the gradual but steady increase in the success obtained from the use of animal lymph, and the procedure at each of the now very numerous stations in France, Belgium, Holland, Italy, Germany, Austria, Switzerland, Russia, Spain, India, and the United States was briefly referred to. He then proceeded to a minute examination of the alleged objections to animal vaccination. He pointed out the fallacy of the idea that calf lymph would be objectionably violent in its results; he ridiculed the objection that it might communicate other animal diseases; he showed what immense improvements had taken place in transmitting lymph from calf to calf, so that now to fail was a very rare exception; he gave statistics to show that its success on the human subject was now at least equal to that obtained at ordinary stations where arm-to-arm vaccination was practised; and he quoted numerous authorities to show that calf lymph could now be quite well preserved, though it certainly did not keep so well in tubes as humanised lymph. On the other hand, the advantages of animal lymph were great and numerous. It induced a more perfect development of vaccinia than followed the use of virus of long humanisation, and in re-vaccination its vaccinal effects were very marked; it enabled stocks of lymph to be replenished when old or enfeebled; it was entirely free from all possibility of syphilitic contamination, and did not induce erysipelas; and it could supply large quantities of lymph at very short notice. Under these circumstances Mr. Hart suggested that the time had come for the Government to modify their views as to animal vaccination, and he recommended that the National Vaccine Establishment of this country should, instead of supplying on demand, as heretofore, lymph of long humanisation, supply only animal lymph. For this purpose an animal vaccine service should be organised in the metropolis, which, from calculations made, could be effected without any increase of expense to the nation.

Great interest was manifested in the Conference, Dr. Warlomont, of Brussels, the energetic Director of the State Vaccine Institute of Brussels, having promised to come over to England purposely to attend it. Moreover the Local Government Board showed their appreciation of its importance by deputing, without solicitation, two of their medical officials—Dr. Ballard and Dr. Cory—to attend it on their behalf. At the first meeting the hall was crowded to excess, and much enthusiasm was displayed. Dr. Warlomont read a lengthy paper, giving the results of his large experience in the matter, and combating the objections to the use of calf lymph. Opinions highly favourable to animal vaccination were expressed by Sir Thomas Watson, Mr. Ceely, Mr. Greene of Friday Bridge, and at a later period by Dr. Braidwood, Dr. Bristowe, Dr. Carpenter, Dr. E. T. Wilson, Dr. Drysdale, and other gentlemen of experience. Against the official recognition of animal vaccination Dr. Ballard made a long and rambling speech, which to a great extent wandered into side issues, and was by no means of a satisfactory kind. Numerous very interesting speeches were made, and much difference of opinion manifested, as to certain points arising out of the main discussion, such as the identity of human small-pox and cow-pox, the deterioration of humanised lymph, and the invaccination of other diseases; but as to the main contention there was no real opposition to the position assumed by Mr. Hart. There is reason, therefore, for hoping that the Government will at least consent to consider anew their objections to animal vaccination, based on a report which, accurate enough at the time, now no longer expresses the present state of the case; and that they will take some means for satisfying the growing demand for lymph which shall be free from any sort of possibility of doing harm. We think that they would be acting quite in their own interest in doing so; and, moreover, they would be able much more effectually than at present to silence the noisy clamour of the anti-vaccination clique, who did all in their power to embarrass the Conference at its last sitting.

With regard to legal matters, an important decision was given on July 2nd in the Exchequer Division on the much vexed question of whether effluvia from offensive trades, in order to come within Section 114 of the Public Health Act, need to be injurious to health as well as a nuisance. The case arose from the prosecution by the Malton Local Board of a company making artificial manures at that place. Evidence was given that effluvia from the manufactory penetrated into some of the houses in the district, causing the inhabitants to close their windows, and in one or two instances nausea and vomiting were attributed to it. On the other side it was contended that this was not a nuisance proved to be injurious to health, and that under the wording of the 114th section of the Act, taken in conjunction with the definitions of nuisances liable to be dealt with summarily under the Act, and contained in the 91st section, particularly sub-section 6, and also on the authority of the well-known and often cited case *Great Western Railway Company* v. *Bishop*, the justices had no jurisdiction unless such a nuisance was proved to be injurious to health. The local justices, relying on the case quoted, had dismissed the complaint, and the questions of law, therefore, for the Court were (1) whether it was necessary to prove not only that a nuisance was caused by the effluvium, but also that it was injurious to health; and (2) if the Court should so decide, had the effluvium been proved to be 'injurious to health' within the meaning of the statute? Chief Baron Kelly, in giving judgment for the appellants, observed that it was not necessary that there should be injury to the health of the inhabitants generally, and that he was clearly of opinion

that any effluvium such as that complained of, which had the effect of causing any person who was ill to become worse, was within the Act. Mr. Justice Stephen, in concurring, expressed his opinion that it was sufficient to prove that the effluvium was a nuisance, whether causing injury to health or not. This is a most important decision, as the effect of the case of the *Great Western Railway Company* v. *Bishop* has been to induce very many justices to regard this and similar sections in the Public Health Act as if they related to a 'nuisance injurious to health', instead of to a 'nuisance or injurious to health', which is very different. The case, therefore, cannot be too widely known, and the decision of the judges acted upon. Another legal case of much sanitary interest was the action brought by the late Sir Rowland Hill and others against the Metropolitan Asylum Board, when the jury found that the Hampstead Small-Pox Hospital was a nuisance *per se*, and that if not a nuisance *per se*, it had been made so by the absence of proper care on the part of the managers. Against this verdict, which was affirmed by the judge, the managers appealed, on the ground that the verdict was against the evidence, and had been founded on misdirection. The case has been dragging on, in one way or other, nearly the whole year, and on the 18th December the Court of Appeal gave directions for a new trial. We may hope, therefore, that before very long the action will be tried on its actual merits, which was hardly the case on the first occasion. A third case of interest was the injunction sought to be obtained by Lord Portman against the use by the Home Hospitals Association, of Berkeley House, Manchester Square, as a hospital for paying patients. The Master of the Rolls reluctantly granted the injunction; but it is satisfactory to record that this will not, as feared, paralyse the useful work of the Association, as they have succeeded in purchasing a freehold suitable for their purpose in Fitzroy Square.

At the Local Government Board there have been numerous changes during the year. The passing of the 'District Auditors' Act, 1879', converted the public auditors of local accounts throughout the country into Local Government Board officials, and opportunity was taken to get rid of several of the older auditors, and to substitute in their place a number of political or personal partizans of Mr. Sclater-Booth, more or less unacquainted with the duties. Towards the end of the year the country was astounded by the announcement that Major Graham, who has been for so many years the conspicuously able and successful Registrar-General, was to be succeeded, not by Dr. Farr, who has been the prop of the office since its establishment, and has a world-wide reputation, but by Sir Brydges Henniker, whose sole known claim to the distinction is that he has served as Mr. Sclater-Booth's private secretary for the last two or three years. It is not surprising that Dr. Farr, thus passed over, should have tendered his resignation; and thus this important office of the State loses at one blow both its best men. It is pleasant to turn from this rather painful subject to the Medical Department of the Board, where Mr. Booth has certainly put the right man in the right place by conferring the post of Medical Officer, vacated through Dr. Seaton's continued illness, upon Dr. Buchanan, the very able Assistant Medical Officer of the Board. An extra appointment as Medical Inspector was, moreover, conferred last June upon Dr. Franklin Parsons, who as Health Officer for the Goole and Selby districts, and in other ways, had shown exceptional ability in sanitary work.

In congresses and conferences the year has been prolific. The first in point of time, the Sewage Conference at the Society of Arts, on the 15th and 16th of May, was the means of bringing together much useful information as to typhoid fever as spread by water; and this point was further enlarged on in the Public Health Section of the British Medical Association at its meeting at Cork in August. At the Social Science Congress a remarkable paper was read by Mr. F. S. Powell, the President of the Health Section, advocating the establishment of a Ministry of Health, and giving many cogent reasons for this advocacy. At the Congress of the Sanitary Institute, held at Croydon in October, a very large number of papers of very unequal merit were read. The more practical and valuable of these papers we have already reproduced in our columns. Abroad, the meetings of the International Congress of Medical Science at Amsterdam, and the meeting of the German Public Health Association at Stuttgart, possessed unusual interest from a sanitary point of view, more especially the former, where a number of distinguished English sanitarians were present.

The position of medical officers of health has unfortunately undergone no improvement during the last year, but rather the reverse. Dr. Cornelius Fox in Essex, and Mr. Wynter Blyth in Devonshire, both men of remarkable ability, have felt compelled to retire from their posts as health officers for combined districts because of the refusal of certain districts in the combination to continue in them any longer. The reasons in both cases were of the most flimsy kind, but the Local Government Board made no effort, beyond a feeble remonstrance, to save the districts from disruption. Dr. Lush has, however, at the request of, and in a form devised by Mr. Ernest Hart, secured a Parliamentary return (not yet published), bringing out all the facts as to the health officering of the entire kingdom; and it is intended to make an effort so that the whole question of the appointment, tenure of office, and emoluments of medical officers of health, may be made the subject of Parliamentary inquiry in the course of next session.

From an epidemiological point of view, the chief event of the year was undoubtedly the outbreak of Plague at Vetlianka, near Astrakhan, which, though it actually happened in 1878, was not publicly known

until January of 1879. The reappearance of this disease in Europe, from which it had been absent for nearly forty years, sent a panic throughout the continent, and all sorts of barbarous and obsolete regulations, designed with the view of saving nationalities from the infection, were put in force by different Governments. Even in England, where the teachings of science should have taught our advisers better, the Council Office deliberately expressed its intention of reviving in its integrity quarantine against plague; and, utterly ignoring the Public Health Department of the Government, took into counsel the Royal College of Physicians to advise it in the emergency. By the advice of the College, two gentlemen, Surgeon-Major Colvill, the civil surgeon at Bagdad, and Dr. J. F. Payne, of St. Thomas's Hospital, were sent out to the infected locality to study the disease. They did not even start until the official notification of the extinction of the disease was published, and their report, which has been issued in a mysteriously confidential fashion, gives us no new facts with regard to the outbreak. All that they could learn was at secondhand, and the general outcome of the affair was certainly such as not to inspire confidence in the promptitude or wisdom of the Privy Council Office, as our supreme health authority in times of national danger. Though, happily, the outbreak did not extend beyond the district where it first appeared, it was extremely fatal within that area, as it carried off within a short time about a fifth of the whole population of the village. In the United States, yellow fever broke out again in the valley of the Mississippi, being especially prevalent at Memphis. A commission of inquiry is now being held into the causes of this prevalence, under the auspices of the newly appointed National Board of Health for the United States. At home, public attention was excited during the early part of the year by the discovery of Mr. W. H. Power, that a large prevalence of diphtheria in the North of London was due to the drinking of milk from a particular dairy. This being the first well authenticated instance on record of diphtheria spread by milk, much discussion was evoked on the subject, especially as to the theory of Mr. Power that the diphtheria was possibly occasioned by a disease of the cow itself, called garget. This speculation is now receiving attention at the hands of the Pathological Society, and there seems ground for hoping that the relation of diseases of the lower animals to those of man (a subject hitherto far too much neglected) will now receive its fair share of attention. An extensive outbreak of typhoid fever at Redhill, due to the specific contamination of the deep wells of the Caterham Water Company by the evacuations of a workman engaged in one of the adits, and suffering from a mild attack of typhoid, came in for much comment. Later in the year a more serious outbreak occurred at Swansea, where, in the course of August and September, no fewer than 460 cases occurred, 63 being fatal. The epidemic was ascribed to the washing, by a violent storm, of filth from a dirty and, in all probability, infected farm into a stream feeding the reservoirs supplying the town. In August a remarkable outbreak of scarlatina occurred in a suburb of Manchester, which was found by Dr. Airy, of the Local Government Board, to have followed the use of milk from a particular dairy. During the year numerous savage outbreaks of diphtheria in small villages were reported; but, beyond Mr. Power's discovery above referred to, no addition has been made to our stock of knowledge with regard to this obscure disease.

It is as yet too early to comment on the vital statistics of 1879, but the continued depression of trade, and the consequent distress, mental anxiety, and straitened means of the population, together with the prolonged cold, wet, sunless weather, and the severe winter of December, cannot but have had their effect in swelling the mortality for the year.

REGISTRARS' RETURNS TO SANITARY AUTHORITIES.

WITH reference to an article on this subject in the last issue of the SANITARY RECORD, we have received a communication from a Metropolitan Medical Officer of Health, pointing out that there is no statute compelling a registrar of the metropolis to furnish these returns, and stating 'that he can charge what he likes, or decline the work altogether'. This statement, although literally correct, conveys an entirely erroneous impression of the true state of the case as regards the relations between Metropolitan sanitary authorities and registrars.

It is unfortunately true that the metropolis was specially excepted from the operation of the Public Health Act of 1872; and as the 28th section of the Births and Deaths Registration Act of 1874 only refers to sanitary authorities 'as defined in the Public Health Act of 1872', it follows that the section is inoperative as regards the London registrars. Previously to the passing of the Births and Deaths Registration Act in 1874, which provided for the legal payment of registrars for furnishing these returns to sanitary authorities, the Metropolitan Vestries and District Boards, which constitute the sanitary authorities of London, received gratuitously, by special arrangement with the Registrar-General, returns furnished by the registrars to the central office for the compilation of the Registrar-General's Weekly Return. The Metropolitan registrars, after the passing of the above-mentioned Act in 1874, naturally complained at being placed, with regard to these returns, in a worse position than their provincial brethren. The Registrar-General endeavoured to secure for his London registrars some payment for the returns which the Metropolitan sanitary authorities had for some time received gratuitously. So many of the Vestries and District Boards, however, declined to pay the small amount proposed for the secondary use of the official returns, that he refused to transmit them in future. The result of this decision was that each sanitary authority that recognised the value of these returns to themselves and their Medical Officers of Health was obliged to make terms with the local registrars to furnish the returns. Some few of the Metropolitan sanitary authorities, although glad to get the returns for nothing, have not thought

them worth paying for, and do not receive them to this day; the large majority, however, at once came to satisfactory arrangements with the registrars, at the same terms as those authorised by Act of Parliament for all other parts of England and Wales. The new arrangement had one manifest advantage which outweighed the small additional cost to sanitary authorities—the registrar's returns now come into the hands of Medical Officers of Health on Monday morning, instead of Wednesday evening, as was the case under the previous gratuitous arrangement.

Although there is no statute binding on the Metropolitan registrars, like their provincial brethren, to furnish their returns at a fixed rate (twopence for each return, and twopence for each entry in the return), it is not a fact that London registrars are free to charge what they like, or to refuse altogether to furnish the returns. We have the best authority for stating that the Registrar-General would never sanction an unreasonable charge for these returns on the part of any registrar, neither would he allow a registrar to withhold such return if payment were offered at the rate that is legal in all parts of England and Wales, except London.

NOTES OF THE MONTH.

THE AIR OF GLASGOW.

Mr. W. J. Dunmachie, of the Sanitary Department of Glasgow, has issued a report on the air of that city, chiefly relative to enclosed spaces and smoke, which is an interesting contribution to the subject so ably treated by Mr. Estcourt in the SANITARY RECORD for September 1879. Glasgow maintains a series of stations at which the average condition of the air is continuously tested, night as well as day. The only other analyses of the kind are those made at the world-famed observatory of Montsouris, near Paris, where they have been carried on without interruption since November 1876. Mr. Dunmachie's paper is too technical to admit of condensation, but his remarks on the subject of ammonia in the air are worthy of reproduction. He says that it is a well ascertained fact that the air contains less impurity after a shower of rain than before it, due to the washing to which it has been subjected. It follows, then, that the analysis of the rain will give a very reliable indication of the state of the atmosphere through which it has passed, and that the degree of purity will vary with the length of time elapsing between the commencement of the shower and the times of collecting the different samples. In a series of observations M. Boussingault found at the beginning of a shower 1.15 milligrammes ammonia per litre; further on, .70, .20, and .10; and at the end, .03 milligrammes. After a cessation of several hours in the rain, he found at the beginning 1.13 milligrammes, or nearly as much as he found at the beginning of the first shower. It would appear from these observations that the source of this atmospheric pollution is indeed a prolific one, for, notwithstanding the degree of purity which had been attained at the end of the first shower, a few hours sufficed to render the air as impure as at first. When this is viewed in the light of the fact that, however prolonged the showers may be, the last drops contain traces of ammonia, either the source of the ammonia remains active, notwithstanding the rainfall, or, by atmospheric commotion and diffusion, fresh portions of air are continually finding their way into the region of rainfall. Mr. Dunmachie is inclined to accept of the former theory, and, if it be the true one, he thinks it would be obviously erroneous to look upon decomposing organic matter as being, under the circumstances, capable of producing the effects above referred to, and he sees no other source except *smoke* adequate to do so. In judging of the healthfulness of any particular town or locality by the quantities of ammonia and albuminoid ammonia contained in the air, great care must be exercised and hasty conclusions avoided, as the physiological effects of these compounds, or rather of their accompaniments, depend entirely upon the origin of such compounds, and that locality or town which shows the smallest percentage of such atmospheric impurity may nevertheless be the most dangerous to health. It does not therefore follow that because less ammonia was found in a court than in a street, the latter would be less conducive to health than the former, as it is highly probable that the great proportion of that found in the court is due to the decomposition of organic matters, chiefly of animal origin, and, in consequence, may be accompanied by the germs of disease. Sulphur compounds are found to be predominant in street air of Glasgow. This fact confirms the opinions expressed by Mr. Dunmachie regarding the chief source of the ammoniacal salts and undecomposed organic matter found in street air.

INFANTILE MORTALITY.

This subject appears to be attracting the attention its importance merits, in London as well as in the provinces. At a recent meeting of the Strand District Board of Works, one of the members, Mr. Pratt, called the attention of the board to the number of deaths recorded among infants and young children, amounting to 50 per cent. of the total deaths. He also said that it was admitted by the medical profession generally that more than three-fifths of those deaths were due to preventible causes, and arose from the carelessness of mothers, overcrowding, and, perhaps, from the drunkenness of the parents. As it was from the overcrowded districts that infantile disorders were produced, he suggested that they should ask their medical officer to make a report as to whether there was an increasing number of deaths of infants and young children in that district, or if he could assure the board that the money they spent in sanitary matters had some effect in decreasing them. If there was no improvement, it would then become a grave question whether they should not take up the matter in a more comprehensive way than it had yet been dealt with, and address themselves to the Home Secretary or Parliament to obtain the passing of a measure so that young children might be placed under proper protection. It would, he thought, be a good work if a mission was formed for instructing mothers in the proper treatment of children, and pointing out the means of preventing the complaints from which so many died. He concluded by moving that the medical officer be instructed to report on the subject. —Dr. Joseph Rogers, in seconding the motion, said that the heavy mortality that took place in the metropolis among young children was shown by his own experience formed among the very poor of St. James's, Westminster, and Soho, to be due in a great measure to the intemperance of the parents. Intemperance among the class he referred to in

London was assuming hideous proportions, and as the mothers drank so much, their milk was unfitted for the children, who, consequently, contracted those fatal forms of diarrhœa that carried them off. It would be instructive to not only public bodies, but also to the community at large, to know how far the deaths of children were due to preventible causes. A large amount of these deaths he was sure was preventible.—The motion was carried, and we shall watch the result with interest.

MARSH FEVER.

Prof. Klebs of Prague, and Prof. Tommasi of Rome, have been examining during the past spring (1879) into the poison which produces marsh fever. The former has, in a recent number of the *Zeitschrift*, given full particulars of the experiments made and the results obtained. These investigators examined the lower strata of the atmosphere of the Agro Romano and its soil. In both they discovered a miscroscopic fungus, consisting of movable shining spores of a long oval shape, about 9 micro-millimètres in diameter. With these spores animals were artificially infected with intermittent fever of the true marsh type, and they showed precisely the same enlargement of the spleen as human beings who have caught the fever in the ordinary way. Messrs. Tommasi and Klebs have given this fungus the name of Bacillus malariæ, as it grows into the shape of small rods.

THE BUDGET OF THE PLAGUE.

The recent epidemic in Astrakhan has cost Russia the sum of £80,000. This reckoning includes the expenses from January 1879, when General Loris Melikoff was appointed Governor-General of the governments of Astrakhan, Saratof, and Samara, up to the month of April, when all danger had disappeared. The budget of the plague presents some features of interest; the sanitary cordons and quarantine arrangements cost £40,000; the surveillance of the Volga, in suspected situations, and the measures necessary to isolate them, cost £2,400; the medical staff, and salaries of the employés, amounted to £10,000; drugs, etc., to £3,600; assistance and indemnities to the inhabitants of the villages, etc., destroyed as a precautionary measure, and the transport of troops, have naturally absorbed the major portion of the sums of money appropriated to arresting the invasion of the scourge.

DR. FARR'S SUCCESSOR.

Rumour busily asserts that Dr. Ogle, Medical Officer of Health for the Combined Sanitary District of East Hertfordshire, will probably be appointed to succeed Dr. Farr as Superintendent of the Statistical Department of the Registrar-General's Office. Inasmuch as the Government has appointed a Registrar-General who has got to acquire a knowledge of registration, it need create little surprise if a Superintendent of the Statistical Department is appointed, who has got to prove any special knowledge of statistics. Should Dr. Ogle be appointed in succession to Dr. Farr, it will be a source of satisfaction to know that he will at least have the advantage of a practical knowledge of the necessity of vital and mortal statistics to the efficient and successful health organisation. At the same time, we are free to confess that we have never seen a report of Dr. Ogle's which shows that he possesses that acquaintance with the service of statistics which should be the indispensable qualification of the successor of Dr. Farr.

THE MEDICAL OFFICER OF THE LOCAL GOVERNMENT BOARD.

We regret to have to record that, with the beginning of the New Year, the Local Government Board loses one of its ablest officials in the person of Dr. Seaton, who has felt bound to resign his position as Medical Officer of the Board, in consequence of continued illness. Dr. Seaton's name has been for the last twelve or fifteen years indissolubly connected with the present system of public vaccination in this country, a system which, mainly through his exertions, is the most complete of the kind in the world. Indeed, Dr. Seaton's principal labours were in connexion with vaccination. In addition to a contribution to *Reynolds' System of Medicine*, he is the author of a *Handbook of Vaccination*, which is the standard book on the subject. By his resignation, the Government loses the services of the last of the early members of the Medical Department of the Privy Council. Although Dr. Seaton has only been permanently a Government official since 1865, he was engaged on vaccination inspections almost from the establishment of the medical department in 1858. On the formation of the Local Government Board in 1871, Dr. Seaton became its senior assistant medical officer; and, on the retirement of Mr. Simon, in May 1876, he succeeded that distinguished public servant as medical officer. It is believed, however, that his health was never equal to the serious strain imposed upon it by the multifarious and responsible duties attaching to the post; and, at the beginning of 1879, he found it necessary to take six months' relaxation from official work. The improvement effected by this rest was, however, only of a temporary kind; and he has lately been seized with a long threatening attack of illness, which made his retirement imperative. The regret at the loss to the medical department caused by Dr. Seaton's resignation will be largely tempered by the announcement that his post has been conferred upon Dr. George Buchanan, who has acted in that capacity for some considerable time. Dr. Buchanan has held, for several years past, the appointment of assistant medical officer to the Local Government Board, having been originally appointed, in 1869, as a sanitary inspector of the Privy Council. Dr. Buchanan is the author of numerous reports, which are among the very best of those issued by his department; and he is well known as a man of singular originality and fertility of thought. In his hands the important work of the department will in no way suffer; and we hail his appointment with much pleasure and satisfaction.

THE MEDICAL INSPECTIONS OF THE LOCAL GOVERNMENT BOARD.

We have been favoured with copies of numerous reports by the Medical Inspectors of the Local Government Board, but the very limited space at our disposal makes it problematical whether we shall be able to give them that prominence which they deserve. We have, however, on former occasions, so fully gone into the method adopted by the medical staff of the Board in making these inquiries, that it seems unnecessary to say more than that the high

standard of excellence of the reports is maintained by those now before us. It seems to us a great pity that reports of this nature are not printed in such a way as to be readily purchaseable by other workers in the same field of action. This is a matter of which we have over and over again received complaints from medical officers of health and others. The Local Government Board goes to the expense of having these reports set up in type, and even illustrated by lithographs, and then prints so small a number that the reports are practically unprocurable very soon after they are issued. The suggestion has been made, and it seems to us well worthy of consideration, that such reports should be laid, as all Board of Trade Reports are, however trivial their nature, upon the table of the House of Commons, so that they might not only be purchaseable for a few pence, but would receive a circulation and consideration infinitely wider than that to which their present form of publication restricts them. At present, no money can buy a copy of any of the reports, and they are only procurable by the special favour of the Local Government Board. It seems to us that if no other consideration is worth entertaining, that of the printing of the reports paying for itself may fairly commend itself to a government which shows itself so economical in small things. But one other observation seems at present needful on the reports before us. Though admirable in themselves, they are yet of a type which ought, properly, to emanate rather from the local medical officer of health, than from a Government Inspector. No small proportion of them are reports on the actual sanitary condition of places, a matter as to which the Local Government Board should be fully informed, from the reports in its possession of the medical officer of health for the district. On page 187 of our number for November last we took occasion to refer to this matter, in commending Dr. Barry's series of special reports; and it certainly seems to us lamentable, that so long after the passing of the Public Health Act of 1872, the Local Government Board should be left in such ignorance of the sanitary circumstances of places, that it has to send down its own inspectors to find out the actual facts. The time of the Government Medical Inspectors would be much more profitably employed in investigating special epidemics, and in general inquiries of the type which Dr. Ballard is so successfully pursuing, than in performing functions which have been improperly abrogated by the local officer of health.

THE CLIMATE OF ILFRACOMBE.

Several communications have appeared in some of our contemporaries as to the mild and equable climate of this sea-side health resort, and amongst others one from Dr. Slade King, the medical officer of health, stating that the temperature had remained so high up to December 16, that geraniums, heliotrope, mignonette, convolvulus minor, roses, fuschias, salvias, verbenas, veronica, nasturtium, calceolarias, carnations, phlox, myrtle, magnolia, and other plants, were then in bloom in the Ilfracombe gardens. He also stated that the frost had been very moderate, only 3° (29° Fahr) having been registered. This is accounted for by another correspondent, by the valley in which the town is situated being surrounded by high hills, from 150 to 800 feet in height, so that no land winds can reach it, whilst it is open to the sea, which is, even there, greatly influenced by the gulf stream. In addition to these advantages, the soil is to a great extent composed of layers of shale, placed at various angles with the soil, so that the rain-water runs off the surface, and does not reduce the temperature of the soil by evaporation, or cut off the rays of the sun by mist. Dr. Slade King, in his little book on the *Climate of Ilfracombe*, says that mists rarely occur, and a dense fog never happens: also, that the mean temperature is nearly identical with that of Torquay, there not being, on an average, more than five frosts in a year. The climate of many of our health resorts will soon be better and more accurately known, as the Meteorological Society is organising between forty and fifty 'climatological stations', amongst which Ilfracombe is enrolled, where the maximum and minimum temperatures, as well as other observations, will be taken daily with certified instruments, placed in the same kind of screen, so as to make the observations capable of accurate comparison. The objection, at present, to the records kept at many of the sea-side and other health resorts, is that the position of the instruments, and the kind of exposure, are not the same. Thus, the rainfall observations, at one of the Torquay stations, have to be corrected in certain years, by adding 25 per cent. to the totals, in consequence of the rain-guage having been placed on the house top. These remarks do not apply to Ilfracombe.

MEASLES AT BOLTON.

Measles has lately assumed alarming proportions at Bolton, where no less than 155 and 294 cases of the disease were reported to the sanitary officer, and twelve and forty-four deaths occurred, during the four weeks ended November 12 and December 10 respectively. Great care has been taken by the medical officer of health to ascertain the whole of the cases, so that the full extent of the epidemic might be known and effectually dealt with. The compulsory clause in the local Act of 1877, requiring the notification of every case of infectious disease, has been found of much service in discovering many of the cases, and great assistance has been rendered by the school teachers, who have readily given lists of children away from school on account of sickness. Some schools were found to have considerably more children suffering from measles than others; and when this was the case, the infected schools have been thoroughly fumigated with sulphur, and cleansed. The disease is scattered all over the town, and seems to have assumed a more malignant character than when it first made its appearance.

TRICHINOSIS ON THE SCHOOL SHIP 'CORNWALL'.

From the statement of a contemporary, it would appear certain that some of the mischief which it was prophesied would arise from our extensive importations of American pork has in fact occurred. An outbreak of so-called 'typhoid fever' on board the school-ship *Cornwall*, has been proved by Mr. W. H. Power to be, not an outbreak of typhoid at all, but of trichinosis, which, in some of its symptoms, resembles typhoid rather closely. Mr. Power's report has not yet been presented, but there seems little doubt that he is on the right track; for the body of the only victim of the outbreak, having been exhumed by permission of the Secretary of State, has revealed unmistakeable signs of the presence of the *trichina spiralis*. Much credit is due

to Mr. Power for this discovery, and we shall await with considerable anxiety his report. The outbreak is stated, on no exact authority that we can learn, to have been due to the ingestion of American pork, as to which there has been much threatened regulation, both here and abroad. That this pork does often contain the trichina, there can be no sort of doubt: but if the pork be properly and thoroughly cooked, no anxiety need be felt in using it.

DR. WILLIAM BUDD.

All Sanitarians will receive with regret the intelligence of the death of Dr. William Budd, of Clifton. His labours in the investigation of the causes of typhoid fever, and its prevention, are amongst the earliest and most enlightened researches on the subject, and have led the way to much subsequent and valuable work.

THE PUBLIC HEALTH

FOR THE FIVE WEEKS ENDING JAN. 3RD.

THE weather, which was unseasonably cold during the greater part of November, continued exceptionally severe throughout December. Almost continuous frost prevailed until the 27th of the month; the mean temperature of the last three days, however, considerably exceeded the average for the corresponding period in 100 years.

In the twenty large English towns dealt with in the Registrar-General's weekly return, and containing nearly a third of the entire population of England and Wales, 24,920 births and 20,518 deaths were registered during the five weeks ending 3rd January. The births were equal to an annual rate of 35.2 per 1,000 persons estimated to be living in these twenty towns, against 36.4 during the four weeks of November. The deaths registered in the five weeks of December were equal to an annual rate of 29.0 per 1,000 of the nearly seven and a-half millions of persons estimated to be living in the twenty towns, against rates increasing steadily from 17.9 to 23.7 in the five preceding months. The December death-rate in these towns in 1876, 1877, and 1878 was equal to 22.8, 24.6, and 29.9 per 1,000 respectively. It is worthy of note that although the cold during last December was more severe than that in December 1878, the rate of mortality was scarcely so high. In December 1878 the mean temperature was 33.8° Fahr., and the annual mortality equal to 29.9 per 1.000; during last month the mean temperature fell to 32.8°, but the rate of mortality did not exceed 29.0 in the twenty towns.

The lowest annual rate of mortality during December, in the twenty towns, was 19.7 in Sunderland. The rates in the other towns, arranged in order from the lowest, were as follows:—Portsmouth, 20.0; Sheffield, 22.6; Brighton, 23.0; Oldham, 23.4; Norwich, 23.4; Bradford, 25.0; Hull, 26.0; Newcastle-upon-Tyne, 26.3; Leicester, 27.0; Leeds, 27.3; Birmingham, 27.8; London, 29.7; Salford, 29.9; Manchester, 30.3; Bristol, 30.6; Nottingham, 31.0; Wolverhampton, 31.4; Plymouth, 36.5; and the highest rate during the month was 36.9 in the borough of Liverpool. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate in December averaged 28.4 per 1,000, while in London it was equal to 29.7. The high-death rates in Liverpool, Plymouth, Nottingham, and Bristol, were mainly due to excessive zymotic fatality, whereas those in Manchester and Wolverhampton do not appear to have been due to the same cause.

The 20,518 deaths from all causes in the twenty towns included 2,930, which were referred to the seven principal zymotic diseases; 813 resulted from scarlet fever, 806 from whooping-cough, 796 from measles, 211 from fever (principally enteric), 178 from diarrhœa, 110 from diphtheria, and 16 from small-pox. The 2,930 deaths returned from these seven zymotic diseases, during the five weeks under notice, were equal to an annual rate of 4.1 per 1,000 in the twenty towns, against 3.8 in November. The zymotic rate averaged 3.9 per 1,000 in the nineteen provincial towns, and was equal to 4.4 in London. The death-rate from these diseases last month did not exceed 1.3 in Portsmouth, 1.4 in Oldham, 1.5 in Norwich, and 1.6 in Brighton; it ranged, however, upwards in the other towns to 4.4 in Bristol, 4.5 in Newcastle-upon-Tyne, 5.4 in Nottingham, and 6.9 in Plymouth. Measles, scarlet fever, and whooping-cough caused the high zymotic death-rate in London, Bristol, and Liverpool; scarlet fever and measles in Nottingham; scarlet fever in Newcastle-upon-Tyne; and measles in Plymouth. The fatality both of measles and scarlet fever declined generally in the latter part of the month, whereas the deaths from whooping-cough showed a marked increase. Measles fatality was exceptionally severe in Plymouth, Liverpool and Leeds; and in Hull, in the latter part of the month. The fatality of scarlet fever was proportionately largest in Newcastle-upon-Tyne, Nottingham, Liverpool, and Sunderland. Of the 110 deaths referred to diphtheria in the twenty towns, 68 were returned to London, and only 42 in the nineteen provincial towns. The fatality of fever (principally enteric) was also greater in London than in the provincial towns, the numbers of deaths from this cause being, respectively, 114 and 97. All the 16 fatal cases of small-port were registered in London, not a single death from this disease being recorded in any of the nineteen provincial towns. The number

CITIES AND BOROUGHS.	Estimated Population at the middle of the year 1879.	During the five weeks ending Jan. 3rd, 1880. Births	Deaths	Deaths from 7 zymotic diseases	Annual Rate of Mortality per 1,000 All Causes	7 Zymotic Diseases
	1	2	3	4	5	6
20 English Towns	7,383,999	24,920	20,518	2930	30.9	4.1
19 Provincial Towns	3,763,131	12,568	10,228	1397	28.4	3.9
London (Reg. Gen.)	3,620,868	12,352	10,290	1533	29.7	4.4
Brighton (borough)	105,608	279	233	16	23.0	1.6
Portsmouth (borough)	131,821	360	253	16	20.0	1.3
Norwich (borough)	85,222	278	191	12	23.4	1.5
Plymouth (borough)	74,303	223	260	49	36.5	6.9
Bristol (city)	209,947	684	615	88	30.6	4.4
Wolverhampton (borough)	75,100	242	226	9	31.4	1.3
Birmingham (borough)	388,884	1,424	1,035	147	27.8	3.9
Leicaster (borough)	125,622	424	325	30	27.0	2.5
Nottingham (borough)	109,396	541	503	87	31.0	5.4
Liverpool (borough)	538,338	1,890	1,904	364	36.9	7.1
Manchester (city)	361,819	1,152	1,052	127	30.3	3.7
Salford (borough)	177,849	613	510	53	29.9	3.1
Oldham (borough)	111,318	358	250	15	23.4	1.4
Bradford (borough)	191,046	622	458	36	25.0	2.0
Leeds (borough)	311,860	1,070	817	117	27.3	3.8
Sheffield (borough)	297,138	958	644	89	22.6	3.1
Hull (borough)	146,347	528	365	48	26.0	3.4
Sunderland (borough)	114,575	412	216	31	19.7	2.8
Newcastle-upon-Tyne (borough)	146,948	510	371	63	26.3	4.5

of small-pox patients in the Metropolitan Asylum Hospitals during December averaged 45, corresponding with the number in November; the weekly number of new cases of small-pox, admitted to these hospitals during December, averaged 11, slightly exceeding the average number in the preceding month. In the last week of 1879 no less than 23 new cases of small-pox were admitted to these hospitals, a higher number than in any week since August last.

The low temperature during December naturally caused a further considerable increase of the fatality of diseases of the respiratory organs. The weekly number of deaths referred to these diseases in London, which had been 168, 301, and 470 respectively in September, October, and November, further rose in December to 702; they were equal to an annual rate of 10.1 per 1,000 during last month. The annual rate from lung diseases and phthisis in the Metropolis during December was 12.4 per 1,000; the rate from the same cause was equal to 12.6 in Salford, and 14.7 in Liverpool. It is to be regretted that similar information is not available for other large towns, as it would throw considerable light upon the wide variations of the gross death-rates.

In the outer ring of suburban districts around London (having a population little short of a million) the annual death-rate from all causes in December did not exceed 21.4, and the zymotic rate was but 2.5 per 1,000. The corresponding rates in inner or registration London were, as before stated, 29.7 and 4.4 per 1,000 respectively.

HEALTH OF OTHER URBAN SANITARY DISTRICTS.

The accompanying Table contains *uniform* mortality statistics for 120 urban sanitary districts relating to December. The number of contributing sanitary districts appearing in the corresponding tables for the five preceding months increased steadily from 36 to 115. The co-operation of very few Medical Officers of Health was specially invited for the first time in December. There is good reason to believe, however, that from the commencement of 1880 there will be a considerable further increase in the number of contributors to our Table of uniform monthly mortality statistics. On the last day of December 160 prepaid post cards for the transmission of the requested information were addressed to the Medical Officers of Health of as many sanitary districts; 120 of these post-cards were returned in time for the publication of their statistics in our present issue. We should esteem it a favour if those Medical Officers of Health who have not yet returned their cards will post them with a few words of explanation, intimating whether in future they will be able to become contributors to our monthly table.

The estimated population of the 120 sanitary districts for which statistics appear in our December table is little short of three millions of persons. The annual birth-rate in those districts furnishing the number of births averaged 33.1 per 1,000, against 35.9 and 34.9 in the two preceding months; in the twenty large English towns the birth-rate in December averaged 35.2.

The recorded birth-rate in December was exceptionally low, and under 24 per 1,000 in Keighley, Pembroke, Leek, Halifax, and Cheltenham. It was exceedingly high, and over 45 per 1,000, in West Bromwich, Burton-upon-Trent, Leigh, Widnes, and Yarrow. Low birth-rates, if continuously recorded, suggest the possibility of an over-estimate of population; while excessively high birth-rates render it probable that the population is under-estimated.

The annual death-rate in the 120 urban sanitary districts averaged 25.2 per 1,000 in December, and was 3.8 below the average rate in the twenty larger towns. The average death-rate, however, in these sanitary districts showed a marked further increase upon that which prevailed in preceding months, mainly due to the far greater fatality of diseases of the respiratory organs. Among those sanitary districts which showed remarkably low death-rates during December the following may be noted:—Reigate, Ryde, Littlehampton, Congleton, Pembroke, Boston, Reading, Eastbourne, and Halifax. Death-rates exceeding 35 per 1,000 were recorded in Abingdon, Chelmsford, Leigh, West Bromwich, Hinckley, Glossop, Swansea, Rochester, Lytham, and Nuneaton. A large proportion of these excessive rates were due to exceptional zymotic fatality; but many of them appear to have been caused by unusually high rates of mortality from diseases of the respiratory organs.

In the 120 urban sanitary districts the annual death-rate from the seven principal zymotic diseases averaged 3.0 per 1,000 during December, against 2.8 in the preceding month; the average rate from these diseases in the twenty larger towns in December was 4.1 per 1,000. No death from any of these zymotic diseases was registered during December in 28 of the sanitary districts; in the remaining districts the zymotic death-rates last month ranged upwards, and exceeded 10 per 1000 in Bolton, Hindley, Swansea, Abingdon, and Devonport. Cheltenham, Merthyr Tydfil, and Oxford, among the larger towns, showed zymotic death-rates under one per 1000.

Small-pox was fatally prevalent during December in Bath, but no death from this disease was registered in any other of the sanitary districts dealt with in our Table. Measles fatality was proportionally excessive in Abingdon, Batley, Bilston, Bolton, Devonport, Gorton, Morley, and Poole; scarlet fever in Barnsley, Burton-on-Trent, Derby, Halifax, Keighley, Middlesborough, Peterborough, Ramsgate, Rochester, and Swansea; and whooping-cough in Jarrow, Richmond, and Tredegar. Three deaths were referred to fever in Jarrow, and six in Swansea; the deaths from fever (mainly enteric) in Swansea, which had been 30, 19, and 7 in the three preceding months, further declined in December to 6.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 7.4 per 1,000 persons living in the 120 urban sanitary districts, showing a further considerable increase upon the rates from the same diseases in the three preceding months, which were 2.2, 3.2, and 4.3 per 1,000 respectively. During December the annual death-rate from these diseases showed a marked excess in Preston, Luton, Coventry, Willenhall Chelmsford, Burton-upon-Trent, Widnes, Lytham, Glossop, Stalybridge, Morley, and Nuneaton. The fatality of these diseases in the last-mentioned town was very remarkable, being equal to an annual rate of 35.0 per 1,000.

Infant mortality, measured by the proportion of deaths under one year of age to deaths registered, averaged 184 per 1,000 in these urban sanitary districts, against 182 in the twenty towns. The proportion was exceptionally high in West Bromwich, Bolton, Coventry, Batley, and Burton-upon-Trent; in the

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1879.

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Abingdon	6,007	11	18	4	4	2	..	3	5	7	..	7	..	..	..	..	..	1	2	..	..	21.6	35.3	13.7	2.0	W. T. G. Woodforde, M.D.
Accrington	30,000	97	71	20	18	1	3	18	11	3	..	..	1	..	..	2	..	20	8	2	..	38.1	27.9	1.2	7.8	J. Ewart.
Altrincham	11,000	25	24	8	7	1	1	3	4	..	..	..	..	..	..	..	..	13	2	..	..	26.8	25.7	0.0	13.9	G. H. Atwell.
Ashton-under-Lyne	33,417	116	71	17	17	2	6	11	18	7	..	4	1	..	2	..	1	14	7	..	8	40.9	25.0	2.5	4.9	W. H. Hughes.
Aston Manor	51,408	173	95	28	22	1	6	13	25	13	..	3	6	..	4	..	..	25	6	3	..	39.6	21.8	3.0	5.7	H. May.
Banbury	13,500	*	24	4	6	2	..	2	10	6	..	4	1	..	..	..	1	2	..	..	..	*	20.9	5.2	1.7	R. Grimbly.
Bangor	7,820	*	23	2	2	..	..	7	12	1	..	..	1	..	..	..	..	8	3	2	..	*	34.6	1.5	12.0	H. Rees.
Barnsley	30,000	103	66	19	15	*	*	*	10	14	..	..	11	..	..	2	1	16	7	2	4	40.4	25.9	5.5	6.3	M. T. Sadler, M.D.Lond.
Barrow-in-Furness	37,500	101	57	18	14	8	7	5	5	7	..	2	3	1	1	..	..	15	5	2	3	32.8	18.5	2.5	4.9	J. Settle.
Bath	53,524	88	135	*	*	12	12	23	48	38	13	18	..	..	2	5	..	31	7	..	21	19.4	29.7	8.4	6.8	A. B. Brabazon, M.D.
Batley	28,721	69	56	20	11	3	..	16	6	9	..	6	..	2	..	..	1	20	2	..	1	28.3	23.0	3.7	8.2	W. Bayldon.
Beccles	5,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. B. Crowfoot.
Bilston	25,000	*	58	*	*	*	*	*	*	19	..	10	8	1	..	..	..	*	*	*	*	*	27.3	8.2	*	W. M. Hancox.
Bingley	9,000	28	14	6	3	..	..	1	4	4	..	..	..	..	..	1	3	5	..	..	..	36.6	18.3	5.2	6.5	J. W. Craig, M.D.
Bishop Stortford	6,938	*	7	1	..	..	..	2	4	..	..	..	..	..	..	..	..	1	..	..	3	*	11.9	0.0	1.7	W. Ogle, M.D.
Bolton†	105,000	315	329	81	100	17	8	73	50	102	..	83	6	1	6	4	2	100	13	7	1	31.3	32.7	10.1	9.9	E. Sergeant.
Bootle-cum-Linacre	25,500	83	44	7	11	5	2	11	8	7	..	1	4	..	1	1	..	15	3	2	1	38.3	20.3	3.2	6.9	R. J. Sprakeling.
Boston†	15,000	36	22	4	2	1	..	6	9	..	..	..	..	..	..	..	..	9	3	2	5	25.0	15.3	0.0	6.3	W. Clegg.
Bridgnorth	6,000	17	14	3	1	..	..	6	4	2	..	2	..	..	..	..	..	5	1	..	4	33.3	27.5	3.9	9.8	A. Mathias.
Bridport	8,138	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. M. Evans.
Bromley (Kent)*	14,931	*	19	6	4	2	1	2	4	6	..	3	..	..	2	1	..	4	..	1	..	*	16.6	5.2	3.5	C. O. Baylis, M.D.
Bromsgrove	6,967	21	18	2	3	..	..	7	6	..	..	..	..	..	..	..	..	7	1	..	3	35.5	30.4	0.0	11.8	C. Carey.
Bursledm	28,763	87	59	10	12	..	4	27	6	2	..	..	..	..	..	1	1	19	1	2	..	35.6	24.2	0.8	7.8	J. M. Taylor.
Burton-upon-Trent	32,400	128	114	43	21	5	4	20	21	17	..	1	10	2	1	2	1	38	5	5	9	46.5	41.4	6.2	13.8	C. Perks.
Bury	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. B. Bott, M.D.
Bury St. Edmunds	15,600	52	40	7	1	1	..	14	17	1	..	..	..	..	1	..	..	11	2	..	5	39.3	30.2	0.8	8.3	F. W. Clarke.
Camborne*	15,000	*	24	16	4	..	2	4	8	4	..	..	1	..	3	..	..	4	4	..	..	*	20.9	3.5	3.5	E. S. Angove.
Cambridge	34,000	82	62	11	5	1	1	17	27	..	..	..	..	..	..	..	..	15	8	1	12	28.4	21.5	0.0	5.2	B. Anningson, M.D.
Canterbury	20,692	70	50	9	4	2	3	11	21	1	..	..	..	..	..	1	..	14	6	1	13	39.8	28.5	0.6	8.0	F. Wacher.
Cardiff	80,150	244	170	30	36	7	8	53	36	24	..	6	6	2	2	3	5	49	12	3	14	35.8	25.0	3.5	7.2	H. J. Paine, M.D.
Carnarvon	10,299	34	27	7	2	2	2	8	6	..	..	..	..	..	..	..	..	7	4	2	..	38.9	30.9	0.0	8.0	H. Rees.
Chelmsford	9,700	43	29	3	4	..	..	4	18	..	..	..	..	..	..	..	..	11	1	..	8	52.2	35.2	0.0	13.3	E. H. Carter.
Cheltenham	45,000	89	83	20	2	..	3	23	35	1	..	..	..	..	..	1	..	21	9	..	10	23.3	21.7	0.3	5.5	T. Wright, M.D.
Chiswick	12,000	50	21	8	4	2	1	2	4	2	..	..	1	..	1	..	..	8	3	1	..	49.1	20.6	2.0	7.9	F. C. Dodsworth, jun.
Colchester	28,633	84	61	21	9	3	2	9	17	4	..	..	..	1	1	2	..	21	8	1	4	34.5	25.1	1.6	8.6	E. Waylen.
Congleton*	12,000	28	13	2	3	1	..	3	4	3	..	1	1	..	..	1	..	4	..	..	..	30.4	14.1	3.3	4.3	P. M. Davidson.
Cosbley	23,000	54	43	12	12	2	1	4	12	5	..	3	..	..	..	1	1	19	3	3	..	27.6	22.0	2.6	9.7	J. Eagleton.
Coventry	41,000	118	115	33	10	2	3	37	30	4	..	..	3	..	1	..	..	41	10	2	18	33.9	33.0	1.1	11.8	M. A. Fenton, M.D.
Croydon	69,500	218	131	29	23	4	8	23	44	12	..	4	3	..	2	2	1	28	14	4	20	35.9	22.2	2.0	4.7	C. W. Philpot, M.D.
Dartford*	9,377	26	15	2	3	..	2	2	6	2	..	2	..	..	..	..	..	4	1	..	4	36.2	20.9	2.8	5.6	E. Moore.
Derby*	80,385	210	147	29	19	*	*	*	35	14	..	1	9	..	1	2	1	40	14	4	18	34.1	23.8	2.3	6.5	W. Iliffe.
Devonport	50,000	*	208	36	81	19	7	24	41	74	..	67	..	2	4	1	..	56	10	3	14	*	49.0	17.4	13.2	J. May, jun.
Dorchester	7,000	18	10	3	1	..	..	3	3	..	..	..	..	..	..	..	..	1	1	..	1	30.3	16.8	0.0	5.0	E. J. Day.

* Statistics for these Sanitary Districts relate to four weeks, or 28 days.

† The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1879.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 years	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Dover	33,028	79	54	7	9	1	3	12	22	6	..	3	1	..	..	1	1	14	4	..	4	28.2	19.3	2.1	5.0	M. K. Robinson, M.D.
Eastbourne	18,000	*	27	9	1	..	..	8	9	1	..	..	1	..	..	..	..	7	1	..	4	*	17.7	0.7	4.6	E. F. Fussell, M.B., M.R.C.P.
East Dereham	5,762	20	8	6	..	..	..	..	2	1	..	1	..	..	..	..	..	2	..	..	..	40.9	16.4	2.0	4.1	H. B. Vincent.
Fenton	13,000	33	30	8	5	2	1	7	7	3	..	..	3	..	..	..	..	11	2	1	..	29.9	27.2	2.7	10.0	A. V. Griffiths.
Finchley†	10,873	20	8	2	..	..	..	..	6	..	..	..	..	..	..	..	..	3	..	..	1	19.2	7.7	0.0	2.9	J. Turle, M.D.
Glossop	17,472	53	56	17	13	2	1	8	16	6	..	3	1	..	1	..	1	21	3	1	1	35.7	37.7	4.0	14.2	J. Rhodes.
Gorton*	30,000	87	68	14	24	1	1	18	10	10	..	7	2	..	..	..	1	24	3	..	..	37.8	29.6	4.3	10.4	R. E. Hammond.
Guildford	9,996	35	23	4	3	..	1	8	7	2	..	..	..	..	..	1	1	4	2	..	..	41.2	27.1	2.4	4.7	J. Morton, M.B.
Halifax	71,500	129	111	26	19	..	..	..	24	14	..	1	12	..	..	..	1	33	11	..	..	21.2	18.3	2.3	5.4	D. Ainley.
Hinckley	7,000	21	22	3	4	1	2	3	9	3	..	..	3	..	..	..	..	6	3	..	..	35.3	37.0	5.0	10.1	W. H. Griffiths.
Hindley	12,000	35	44	6	14	9	..	6	9	13	..	..	11	..	..	2	..	20	2	1	..	34.3	43.2	12.8	19.6	J. G. Brayton.
Huddersfield†	80,245	252	167	41	26	10	6	39	45	9	..	..	4	1	1	1	2	38	14	8	16	32.7	21.7	1.2	4.9	J. S. Cameron.
Ilfracombe	5,300	14	13	3	2	1	2	3	2	..	..	..	..	..	..	..	..	4	1	..	..	31.1	28.9	0.0	8.9	E. J. Slade-King, M.D.
Ilkeston*	12,057	46	20	5	4	..	1	4	6	..	..	..	..	..	..	..	..	2	2	2	..	49.7	21.6	0.0	2.2	R. Wood.
Ipswich	47,414	144	166	42	44	*	*	*	36	22	..	7	..	..	11	2	2	52	2	7	18	35.8	41.2	5.5	12.9	G. S. Elliston.
Jarrow	22,000	101	57	16	19	3	4	9	6	17	..	5	..	..	8	3	1	11	3	2	1	54.1	30.5	9.1	5.9	J. Spear.
Keighley	27,000	37	75	22	16	4	3	14	16	11	..	3	6	..	..	1	1	17	3	..	3	16.1	32.7	4.8	7.4	A. Roberts.
Leamington	23,814	51	54	8	3	6	1	10	26	4	..	..	4	..	..	..	..	15	3	1	..	25.2	26.7	2.0	7.4	J. S. Baly.
Leek	12,391	21	24	2	2	2	1	8	9	..	..	..	..	..	..	..	..	12	3	..	1	20.0	22.8	0.0	11.4	J. . Ritchie.
Leigh	20,400	82	58	20	8	4	1	7	18	3	..	1	1	..	1	..	..	14	1	3	..	47.3	33.5	1.7	8.1	J. Hall.
Lichfield	7,828	25	24	3	1	..	1	3	16	1	..	..	..	..	..	..	1	7	1	..	3	37.6	36.1	1.5	10.5	G. A. Carter, M.D.
Lincoln	31,526	104	65	16	13	2	1	9	24	4	..	1	2	..	1	..	..	17	2	1	9	38.8	24.3	1.5	6.3	C. Harrison, M.D.
Littlehampton	4,032	9	5	..	..	1	1	..	3	..	..	..	..	..	..	..	..	1	..	..	..	26.3	14.6	0.0	2.9	C. Kelly, M.D.
Liversedge	13,458	31	28	6	7	..	..	8	7	..	..	..	..	..	..	..	..	8	2	..	..	27.1	24.5	0.0	7.0	W. J. Sykes, M.D.
Luton	23,600	81	53	15	9	3	5	8	13	8	..	2	..	..	3	2	1	23	7	..	7	40.4	26.4	4.0	11.5	H. Sworder.
Lytham	5,000	24	20	4	..	1	1	6	8	..	..	..	..	..	..	..	..	8	2	..	..	56.5	47.1	0.0	18.8	W. E. Pountney, M.B.
Maidenhead	8,052	17	21	4	5	1	—	2	9	3	..	2	..	..	1	..	..	5	1	..	3	24.9	30.7	4.4	7.3	W. T. G. Woodforde, M.D.
Maidstone*	29,148	65	46	13	3	1	2	10	17	2	..	..	..	..	2	..	..	14	3	..	1	29.1	20.6	0.9	6.3	M. A. Adams.
Merthyr Tydfil†	50,350	133	120	27	13	8	7	28	37	4	..	..	1	..	..	1	2	29	17	5	6	27.5	24.9	0.8	6.0	T. J. Dyke.
Middlesbrough	53,580	160	90	20	23	5	4	26	12	16	..	..	9	2	2	3	..	28	4	3	3	35.2	19.8	3.5	6.2	J. A. Malcolmson, M.D.
Middleton and Tonge	16,550	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	*	..	..	..	T. B. Knott.
Morley*	11,546	50	30	6	14	1	1	3	5	7	..	5	..	2	..	..	..	14	1	..	..	56.4	33.9	9.9	15.8	S. T. Steele.
Neath	12,000	36	22	6	..	..	3	7	6	..	..	..	..	..	..	..	..	5	1	..	3	35.3	21.6	0.0	4.9	G. Ryding, M.D.
Newark	13,426	52	37	13	4	2	1	4	13	2	..	..	..	1	..	..	1	10	..	..	3	45.6	32.5	1.8	8.8	A. Ashby, M.B.
Newbury	8,097	23	16	4	..	..	..	2	10	1	..	..	..	..	..	..	1	1	..	1	2	33.4	23.3	1.5	1.5	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	47	35	9	4	1	2	10	8	..	..	..	..	..	..	..	..	12	1	..	3	30.7	22.9	0.0	7.8	St. J. Edwards, M.D.
Nuneaton	7,400	23	42	14	7	3	2	5	11	3	..	2	..	..	..	..	1	22	1	2	..	36.6	66.9	4.8	35.0	E. Peacock.
Oakworth	5,800	12	13	3	..	3	1	3	3	4	..	..	3	..	..	1	..	2	1	..	..	24.3	26.4	8.1	4.1	F. W. Barry, M.D.
Oldham†	111,318	358	250	68	50	12	15	61	44	17	..	4	5	..	5	1	2	89	20	5	21	33.5	23.4	1.6	8.3	J. M. Sutton, M.D.
Oxford*	37,000	85	64	7	9	3	4	14	27	1	..	1	..	..	..	..	..	16	5	..	10	30.0	22.6	0.4	5.6	A. Winkfield.
Pembroke	15,000	22	19	2	..	1	1	6	9	1	..	..	..	..	..	1	..	4	1	..	..	17.3	14.9	0.8	3.1	D. P. Saer.
Penzance	11,000	17	23	3	2	..	..	8	10	1	..	..	..	..	..	..	1	10	1	1	..	18.2	24.6	1.1	10.7	G B. Millett.
Peterborough†	20,000	61	57	18	10	3	3	11	12	16	..	3	7	..	1	1	4	14	4	2	..	31.8	29.7	8.3	7.3	W. Thomson, M.D.

* The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

† The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF DECEMBER 1879.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1879.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus (enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Poole	11,361	30	36	6	9	2	1	9	9	5	..	5	..	..	..	..	..	10	3	1	1	31.1	37.3	5.2	10.4	H. A. Lawton.
Preston*	87,600	231	184	45	26	10	10	51	42	8	..	2	3	1	..	..	3	70	17	3	5	34.4	27.4	1.3	10.4	H. O. Pilkington.
Ramsgate	25,000	70	45	10	5	2	..	17	11	..	..	..	7	..	..	..	1	9	2	3	2	33.0	21.2	3.8	4.2	W. G. Gray.
Reading*	40,000	101	51	8	10	3	3	9	18	3	..	..	1	1	..	1	..	10	4	1	2	32.9	16.6	1.0	3.3	J. Shea, M.D.
Redditch	9,686	36	19	7	5	..	2	2	3	2	..	..	..	..	..	1	..	5	2	..	..	43.7	24.1	2.4	6.1	H. Page.
Redruth	9,500	16	22	8	..	3	..	2	9	..	..	..	..	..	..	..	..	9	..	1	..	19.8	27.3	0.0	11.2	J. S. Hichens.
Reigate	17,700	42	20	4	2	1	2	5	6	2	..	..	..	..	..	1	1	7	2	..	2	27.9	13.3	1.3	4.7	E. L. Jacob.
Richmond (Surrey)	17,500	54	43	9	7	3	2	6	16	4	..	..	..	..	4	..	..	10	2	2	4	36.3	28.9	2.7	6.7	J. T. Rowland, M.D.
Rochdale	71,904	178	150	30	33	9	7	33	38	14	..	9	3	..	..	1	1	53	12	1	..	29.1	24.6	2.3	8.7	J. Henry, M.D.
Rochester	18,352	45	64	13	9	7	2	13	20	9	..	3	5	..	..	1	..	13	9	3	13	28.9	41.1	5.8	8.3	J. Sladon-Knight, M.D.
Rotherham*	34,404	93	49	14	10	2	3	8	10	8	..	..	3	..	1	1	..	..	..	..	7	35.2	18.6	2.3	0.0	J. Hardwicke, M.D.
Rowley Regis	27,000	102	47	14	10	2	3	8	10	8	..	..	1	..	..	1	5	11	1	1	..	49.3	22.7	3.9	5.3	H. R. Ker.
Rugby	8,860	28	18	3	2	..	..	4	9	2	..	..	..	..	2	..	..	8	1	1	1	37.2	23.9	2.7	10.6	G. Wilson, M.D.
Runcorn	14,000	51	29	7	1	3	1	8	9	..	..	..	..	..	..	..	..	5	5	..	..	42.9	24.4	0.0	4.2	R. H. Mouritz.
Ryde	12,800	*	15	1	1	..	..	3	10	..	..	..	..	1	..	..	..	6	2	..	2	*	13.8	0.0	5.5	A. Platt Wilks, M.B.
Skipton†	9,100	34	31	8	7	..	1	8	7	4	..	..	1	1	..	2	..	9	3	..	2	38.9	35.5	4.6	10.3	F. W. Barry, M. D.
Smethwick	21,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. Sutton.
South Shields†	61,000	175	110	28	24	4	6	29	19	15	..	1	2	1	6	3	2	32	4	3	3	29.9	18.8	2.6	5.5	J. Spear.
Stalybridge	23,124	51	57	13	7	..	2	21	14	4	..	1	1	..	1	..	1	30	8	..	..	26.0	29.0	2.0	15.3	F. J. Roberts-Dudley.
Swansea	65,000	190	216	39	57	31	11	37	41	71	..	..	64	..	..	6	1	46	15	2	14	34.4	39.1	12.9	8.3	E. Davies.
Swinton†	7,753	35	21	8	5	..	2	4	2	2	..	..	..	..	1	1	..	10	..	..	..	47.1	28.3	2.7	13.5	C. S. Blythman, M.B.
Taunton	16,138	45	30	3	3	1	1	6	16	3	..	..	1	..	1	1	..	11	..	4	4	32.8	21.9	2.2	8.0	H. J. Alford, M.D.
Teignmouth	7,000	13	20	5	1	..	..	6	8	2	..	..	..	..	2	..	..	8	2	..	..	21.8	33.6	3.4	13.4	W. C. Lake, M.D.
Tiverton*	10,400	19	17	3	2	..	1	5	6	..	..	..	..	..	..	..	..	5	2	..	1	23.8	21.3	0.0	6.3	J. P. McNeill, MD. (Dep.)
Torquay	25,000	*	55	8	3	2	4	15	23	4	..	..	..	..	2	1	1	15	9	2	..	*	25.9	1.9	7.1	P. Q. Karkeek.
Toxteth Park	8,000	27	18	8	2	2	..	4	2	3	..	..	3	..	..	..	..	7	3	..	..	39.8	26.5	4.4	10.3	R. W. Pendleton.
Tredegar	16,000	46	48	7	8	6	4	7	16	10	..	..	..	..	9	1	..	14	1	4	4	33.8	35.3	7.4	10.3	G. A. Brown.
Trowbridge	12,000	30	21	4	..	..	1	6	10	2	..	..	..	..	..	..	2	8	1	..	..	29.4	20.6	2.0	7.9	G. C. Taylor, M.D.
Truro	11,049	22	16	4	..	..	1	6	5	..	..	..	..	..	..	..	..	4	3	..	1	23.5	17.1	0.0	4.3	E. Sharp.
Tunstall	15,300	42	29	10	5	..	1	8	5	1	..	..	..	..	..	1	..	10	2	..	..	28.7	19.8	0.7	6.8	J. P. Edwards.
Tynemouth	43,531	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. S. Wade.
Wakefield	32,500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	T. Stephens.
Wallasey†	20,000	41	29	6	6	1	1	9	6	4	..	1	1	..	..	1	1	8	..	5	1	21.4	15.1	2.1	4.2	I. Byerley.
Warrington	37,000	119	103	36	22	..	4	25	16	5	..	1	..	..	1	..	3	43	5	5	10	41.9	36.3	1.8	15.2	G. W. Joseph.
Wednesbury*	26,000	64	44	10	11	3	..	11	7	7	..	3	..	..	2	1	1	14	1	3	..	32.1	22.1	3.5	7.0	J. C. Garman.
West Bromwich†	54,000	233	189	57	36	*	*	*	43	8	..	2	..	..	1	3	2	*	*	9	4	45.0	36.5	1.5	*	J. Manley.
West Derby	32,263	67	74	10	16	5	2	16	25	11	..	3	3	..	3	1	1	26	7	..	2	24.5	27.0	4.0	9.5	W. Carter, M.B.
Weymouth	14,000	31	22	3	3	3	..	3	10	1	..	..	..	..	..	..	1	6	2	..	2	26.1	18.5	0.8	5.0	H. Tizard, M.D.
Widnes	22,000	97	48	18	8	4	2	6	10	..	..	..	..	..	..	..	..	26	..	2	1	51.9	25.7	0.0	13.9	W. Cooper.
Wigan	45,432	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. C. Barnish.
Willenhall†	18,943	53	36	8	12	..	1	4	11	..	..	..	..	..	..	..	..	23	..	..	..	29.3	19.8	0.0	12.7	W. H. Hartill.
Withington*	15,000	22	11	1	1	..	1	4	4	..	..	..	..	..	..	..	..	3	1	..	..	19.1	9.6	0.0	2.6	T. C. Railton, M.B.
Worthing	9,365	24	20	4	7	..	..	3	6	6	..	4	..	..	2	..	..	3	1	..	..	30.2	25.2	7.5	3.8	C. Kelly, M.D.
York	46,436	134	116	25	17	11	5	19	39	14	..	5	6	..	..	3	..	28	5	2	2	30.1	29.4	3.5	7.1	S. W. North.

* The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

† The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

latter town infant mortality, measured in this manner, was equal to 336 per 1,000.

In our next issue we hope to publish statistics for the first month of 1880, relating to a larger number of contributing urban sanitary districts, as many additional medical officers of health have offered to co-operate from the commencement of 1880. Medical officers of health will materially lighten the labour of tabling and publishing these monthly statistics if they will transmit their cards as soon as possible after the close of each month. Cards which are not received by us on or before the 8th of the month can seldom be published in our next issue which goes to press on the 11th. As all the calculated rates are revised previously to publication, we are willing to make the calculations, if medical officers prefer to send only the facts which form the basis of the calculations. We shall be glad to furnish prepaid post-cards for the transmission of these monthly figures to any medical officer of health who will signify that he is able and willing to co-operate in our effort to publish uniform and completely trustworthy mortality statistics of urban sanitary districts.

SPECIAL REPORTS.

REPORT OF SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on December 19th, Dr. Bristowe, President, in the chair. After the minutes were read, a communication from the Northumberland and Durham Medical Society respecting the spread of infectious diseases through Public Elementary Schools was considered, when the Secretaries were requested in reply to state the action already taken by the Society in the matter. Dr. Kelly, Professor of Hygiene, and Medical Officer of Health for the West Sussex Sanitary District, and Dr. Saunders, Medical Officer of Health for Middlesex and Herts Sanitary District, were elected as Extra-Metropolitan Members. Dr. Dixies Maxie and Dr. Sykes were proposed as Associates. Dr. Dudfield proposed that as no reply had been received from the Local Government Board as to the definition of a 'pauper' under the Poor Law Act, another letter should be written, which was agreed to. Dr. Vinen mentioned the singular action of the officers of the Metropolitan Board of Works in opposing the cow-shed licenses, but no resolution was moved thereon. A letter of condolence was ordered to be sent to the relatives of the late Mr. Harry Leach, who was a member of Council.

Dr. Tripe then read his paper on 'Disinfectants in contradistinction to Deodorants and Antiputrefactive Agents'. He commenced by saying he thought it advisable to point out the strange medley of substances now sold under the name of disinfectants, which embraced destructive, preservative, and deodorising agents. He thought the name should be restricted to heat, and those chemical compounds which destroy life, as the antiputrefactives merely suspend the chemical action of air on the matter with which they are brought into contact, and the deodorants act by oxydization, which is a totally contrary action. He did not believe that these deodorants exercised any effect on the germs or particulate matter by which zymotic diseases are spread until the latter ceased to have vitality, and that they therefore are not true disinfectants. In his opinion the most reliable disinfecting agents for ordinary use are heat, sulphurous acid, hydrochloric acid and chlorine, with the addition to the list of glacial aromatic vinegar for those who do not object to the price. He then gave a summary of the use of heat and sulphur fumigations in the Hackney District, stating that 14,210 articles, consisting of beds, mattrasses, bedding, carpets and clothing, had been disinfected at the apparatus belonging to the Board, and also about 2000 rooms since 1872. The temperature employed was between 230 and 250 deg. Fahr., and no instance of subsequent disease occurred in these rooms, except during the period of incubation amongst those who had become infected before the articles were removed and the rooms fumigated. The ordinary quantity of sulphur employed was from half a pound to a pound and a half, according to the size of the room. He next referred to some experiments on vaccine lymph with carbolic acid by Messrs. Vacher and Braidwood, and Dr. J. Dougal, of Glasgow, the former experimenters showing that a mixture of the two when kept in sealed tubes would not produce vaccine vesicles, whilst the latter found that if the mixture were exposed to the air, so as to allow the carbolic acid to evaporate, it again became infective. This seemed to be conclusive against carbolic acid being a true disinfectant, *i.e.*, as being capable 'of permanently removing the cause of infection'. Sulphates of copper, iron, and zinc, chloralum, thymol, etc., belong to the same class, viz., the antiputrefactives. Dr. Tripe thought that the confusion now existing by the inclusion of these and other substances with true disinfectants arose from the supposition that what would destroy bacteria or prevent putrefactive action in albuminous substances would also remove the infective power of a zymotic poison. As regards deodorants such as Condy's Fluid, Sanitas, and other substances giving off oxygen, they were useful, especially if diffused by a spray producer, owing to their action on putrid or putrescible organic matter in the air, or by their direct application to such matter in a solid form, by which the offensive matter is converted into harmless compounds; but he was not aware of sufficient evidence to show that 'germs' were capable of destruction by those substances. He objected to the use of carbolic acid and similar substances in infected houses, as it caused a false confidence; but in making this statement it must not be supposed that he opposed the use of oxydising agents by the spray producer, or of disinfectants to the evacuations and clothes of the patients.

Dr. Stevenson said he agreed with most of what Dr. Tripe had stated, and desired to supplement the paper by giving the results of his examination of a number of substances sold as disinfectants. He found that chlorinated lime yields about 30 per cent. of chlorine when treated with an acid, and the solution about 3 per cent., so that the cost of 1 lb. of chlorine obtained from the first is about 8d. per lb., and from the latter about 10s. per lb.; whilst Labarraques' solution, which contains only about one-ninth per cent. of chlorine, would cost about £70 sterling per lb. of chlorine. Permanganate of potash at 2s. 6d. per lb. when treated with hydrochloric acid yields chlorine at the rate of 3s. per lb., but when sold in solution as Condy's red fluid, the 1 lb. costs about £4. Euchlorine produces chlorine at a cost of 50s. per lb. Sporokton, which is a solution of sulphurous acid gas with Burnett's fluid, is a convenient form of applying that gas, only that it must be carefully employed. Dr. Dixon referred to

terebene, and Dr. Bute to sanitas, which he considered to be a good deodoriser. Dr. Willoughby asked if Dr. Tripe had used bisulphide of carbon, which he found a very useful way of obtaining sulphurous acid. Dr. Heron alluded to the frequency with which bacteria are found in summer diarrhœal discharges, and objected to the use of carbolic acid in such rooms, as persons often thought they were safe in staying with those infected with smallpox, etc., when carbolic acid was sprinkled therein. The President referred to Dr. Baxter's investigations on the action of disinfectants, undertaken by order of the Local Government Board, and considered they should be continued. He agreed with Dr. Tripe, that a disinfectant should be capable of destroying living organisms, and that it is not advisable to use disinfectants whilst persons remain in the rooms. He believed that the injurious effects of bacteria arise from the fluid they generate obtaining admission into the system. Dr. Tripe in reply expressed his regret that the discussion had turned so much on individual disinfectants instead of the subject of his paper, which really was 'What is a disinfectant? He noticed at some length the experiments performed since Dr. Baxter's investigations, and seconded a resolution that the Local Government Board be asked to direct their continuance, which was carried.

Dr. Dudfield referred to the deaths of two children from glanders, related in his last annual report. There was no evidence to show how the child became infected; and he thought it might have been through the air, as the staircase opened into the stable; but the second case—that of a young woman of eighteen—was most probably from contagion, as she nursed the first child, whose neck was extensively ulcerated. He called attention to the large number of cases reported now as compared with former years, and suggested that the disease is spread by drinking fountains, as mucus is often seen floating on top of the water. He thought the horses in the night cab stands should be periodically visited. Dr. Stevenson agreed in this suggestion. The President believed the disease was spread by direct infection, and that it is a most rare disease in man, as he had seen only two or three cases in all his long hospital experience.

Dr. Churchill then showed a piece of leaden ventilating pipe which had been carried inside a house to ventilate the drain, and had a hole in it through which sewer gas escaped into the house. There was much difficulty in finding out the cause of the smell, as the hole was next to the wall, and was not visible. It was detected by pouring water down the pipe. Dr. Browning then mentioned the action he had taken under the Canal Boats Act. ' He had examined 492 boats passing through his district, and had only been able to obtain the registration of two, although about one-third were not registered. He tried to compel registration, but was defeated. After some conversation on the subject the meeting adjourned.

THE PARKES MUSEUM OF HYGIENE.

AT the Parkes Museum of Hygiene, University College, Gower Street, a series of practical demonstrations of the uses of sanitary appliances was commenced on the 3rd instant. Mr. Mark H. Judge (the curator) stated that Professor Corfield would deliver the first and second address on the subject of 'House Drainage', and 'Ventilation, Light, and Warmth', which would be followed by lectures on 'Food', by Dr. G. Poore, and on 'The Hospital and Sick Room', by Dr. J. C. Steele. The demonstrations are given under the auspices of the Committee of the Parkes Museum of Hygiene, and the Council of the Working Men's Club and Institute Union. They are intended for working men, and will take place on alternate Saturdays. Professor Corfield drew attention to various kinds of drain pipes in use in houses. Those pipes, instead of being made of brick, ordinary tiles, or other pervious material, as was generally the case, should be composed of some impervious material, so that the foul water could not soak through. They should be made of glazed stoneware, and should be jointed in a very different manner to that now generally adopted. He discouraged the use of cement for joints, and described Stanford's patent of gutta percha rims to the ends of the pipes, which, by the use of a little grease could be connected and rendered water-tight. Instead of bell traps for yards, syphon gulleys should be used, and after referring to various road gulleys and Rogers-Field's flush tanks, Professor Corfield described some traps intended to disconnect the soil pipes and sinks from the house sewers, which it was important should be used, provided there was an air inlet from the drain. A number of examples of defective plumbing, chiefly associated with the old D trap, were next given, and the professor strongly discouraged the use of those traps, which were contrivances which caught a great deal of solid matter, and instead of those traps he advocated the adoption of valve-syphon traps. Every one of the instances of the defects in the joints which he illustrated was connected with a case of disease or death. He also particularly drew attention to a D trap in the museum, which had been several times mended, and was chiefly composed of zinc, and he said that it was the most extraordinary specimen of scamped work that he had ever witnessed. Drain-lead, or even better cast lead, syphon traps, with screw-taps for the purpose of inspection, were far better than D traps, and should be used in sinks.

REPORTS OF MEDICAL OFFICERS OF HEALTH FOR COMBINED DISTRICTS.

BERKSHIRE.—The district served by Dr. Woodforde is a very large one, and it would seem impossible that it can be satisfactorily worked by one officer. There are evidences, however, of Dr. Woodforde's great energy throughout the whole of his reports, and he evidently does the very best that can be done under the circumstances. The district, which was constituted by voluntary action in 1873, consists of the Newbury, Abingdon, Wallingford, Bradfield, Cookham, East Hampstead, and Windsor rural sanitary districts, and the Newbury, Speenhamland (recently merged in Newbury), Abingdon, Wallingford, and Maidenhead urban sanitary districts. Its area is 375,534 acres (or nearly 600 square miles), and its estimated population in 1878, 137,650. Dr. Woodforde was originally appointed in 1873 for a term of three years, and was subsequently re-appointed for another five years. He receives £750 per annum, half of which is paid by Government, and he is required to give his whole time to the performance of his duties. No allowance is made for expenses of any kind, which is a very objectionable arrangement, as it offers a direct premium on

the neglect of the work. Dr. Woodforde has fitted up a laboratory, and has performed a vast number of quantitative water analyses at his own expense, which can hardly be reasonably expected of him. Dr. Woodforde's reports have always been interesting, though the delay in their appearance is to be deplored. He gives, which is especially valuable, a complete account of the circumstances under which infectious disease has appeared in his district, and carries from one year to another the record of the improvements effected as regards drainage, water-supply, etc. In his initial report (that for 1874) the sanitary characteristics and requirements of the dictrict were sketched out, and it is thus possible to check year by year the improvements effected. Dr. Woodforde's tabular statements are very elaborate, too elaborate, we are afraid, since they must take up an enormous amount of time that might be more profitably employed. But they at any rate enable us to get, so far as statistics of mortality can show, a very good idea of the improvements effected during Dr. Woodforde's five years of office. Comparing the figures given in the supplement to the 35th Report of the Registrar-General for the years 1861-70, with those for the years 1874-8, we find that the actual number of deaths from all causes has remained nearly stationary, notwithstanding the large estimated increase in population, and that in zymotic diseases generally the diminution in the mortality has been rather more than a sixth; while in continued (mainly 'enteric') fever, the disease which more than any other is spread if not actually originated by defective sewerage and impure water, the decrease is considerably over fifty per cent. Equally distinct (though not to the same extent) is the diminution in the fatality of phthisis, the mean yearly deaths from which, estimated according to the increase in population, have fallen by a sixth during the period under review. On the other hand, we find that the deaths from diphtheria and diarrhœa have remained at nearly the same rate as before, while there has been a distinct increase in the mortality from lung diseases, due mainly to the prevalence of acute inflammatory affections of these organs in the years 1875 and 1878. Moreover, there is a distinct lessening in the mean yearly number of deaths at each period of five years up to 65, and the figures show that it is not until old age is attained that there is any increase of mortality. Further, even during the year 1878, in which the deaths were considerably above the average in childhood and after maturity had passed, those occurring between 15 and 45 were fewer by a fifth than in the period 1861-70. During the five years embraced in this review, the mean yearly death rate from all causes has fallen from 19.2 to 18 per 1,000 living; the rate from zymotic diseases has decreased from 2.44 to 1.42 per 1,000, the proportion of deaths in this class to the total mortality being barely 10 per cent. in the second as compared with 12.7 in the former period. This improvement is, however, unequally divided among the various districts included in the sanitary combination. In Urban areas, the evil effects of bad sanitary surroundings are intensified by the aggregation of dwellings and of population to a degree that does not obtain in the scattered cottages of the Rural districts, and on comparing the deaths for the five years in the Rural and Urban districts respectively, we find that whilst the mean death-rate in the former for the five years 1874-8 was 16.6, that of the latter was 19.10 per 1,000. The different sanitary districts show of course very varying death-rates, the lowest in 1877 being the Easthampstead rural district, with a rate of 12.7, and the highest Abingdon borough, with a rate of 23.2, the lowest and highest in 1878 being Easthampstead Rural (14.8) and Wallingford Urban (22.3). During the year 1877, a total of 333 deaths occurred in the combined district from zymotic diseases. Of these 17 were from small pox (9 in the Hungerford rural district), 25 from measles (13 at Maidenhead), 82 from scarlatina (chiefly prevalent at Newbury, Thatcham, and neighbouring villages, and Tilehurst and its neigbourhood), 13 from diphtheria, 32 from whooping-cough, (16 at Maidenhead), and 28 from enteric fever (5 at Maidenhead and 9 in the rural district of Windsor). In the year 1878 there were 381 deaths from zymotic diseases in the combined area, 12 from small-pox, 23 from measles, 66 from scarlatina, which was epidemic at Abingdon and its neighbourhood, and also at Cholsey, 27 from diphtheria, 60 from whooping-cough, and 28 from typhoid. A very large proportion of the cases of small-pox in both years were due to importation from London, and it is much to be regretted that the authorities within the area have not provided means of isolation which would prevent the spread of the disease when it happens to break out in their districts. Dr. Woodforde gives some very instructive instances of the careless and ignorant fashion in which small-pox, and scarlet fever also, are allowed to disseminate themselves. Undoubtedly, the Thames floods had much to do with some of the deaths from enteric fever, since in the parts that suffered most from that disease, large tracts of land had previously been entirely submerged. Both houses and gardens were thoroughly sodden with filthy water, and as the closets are mostly situated at the ends of the gardens, it was impossible for the inmates of many houses to get at them, so that the slops and excreta were emptied out of the windows into the water below, while, drains being choked and the contents of the cesspits forced up, the filth was in some cases floating about inside the houses, and the wells were rendered unusable. Ordinary sanitary work in the shape of supervision and repression of nuisances would appear to be well looked after, and progress is being made with the sewerage and water-supply of some places in the district. Much, however, remains to be done; and as the attacks of infectious disease reported are almost always found to happen in localities where the sanitary conditions are faulty, this should be an incentive to the authorities to do still more.

CARNARVONSHIRE.—This combination was, we believe, the first county combination formed by the Local Government Board under the powers conferred upon them by section 286 of the Public Health Act. It consists of the Bangor and Beaumaris, Carnarvon, Conway, Festiniog, Llanrwst, and Pwllheli Rural Sanitary Districts, and the Bangor, Bethesda, Carnarvon, Conway, Criccieth, Dwygyfylchi, Llandudno, Llanfairfechan, Pwllheli, and Ynyscynhaiarn Urban Sanitary Districts. The total area is 587,748 acres, and the population is 148,669. It has the great merit of containing within its area no authorities which are not in combination, and is, perhaps, the one example of those county combinations of which we used to hear so much. Mr. Rees, the Officer of Health, is paid a salary of £800 per annum. No allowance is made to him for travelling, but stationery and laboratory expenses are allowed. The district was formed in May 1876—after a tedious course of negotiation extending over nearly four years—and an attempt was made soon

after to impose upon the Poor-Law District Medical Officers of the area the duties of Assistant Medical Officers of Health. Although an order was issued by the Local Government Board providing for this assistance, we believe that it has remained entirely a dead letter. Mr. Rees has issued two annual reports, both of which testify to his activity and zeal. There is still room for improvement in them, and especially we should like to be told exactly how the district is progressing as regards sanitary works. A few paragraphs, again, commenting on the movement of population and the prevalence or absence of zymotic diseases, would not be thrown away. We can understand Medical Officers of Health desiring to make their reports as condensed and practical as possible; but they should aim at a circle of readers beyond the limits of their particular districts. It is beyond doubt that Mr. Rees has accomplished a vast amount of sanitary improvement in the county since his appointment, though, looking to the geography of the district, we should be inclined to doubt whether he can properly supervise the whole of this large area. Experience, however, can alone show whether the district is or is not too large; and certainly no complaint can possibly be made of Mr. Rees' want of energy. The general death-rate of the county for 1878 was higher than that for 1877; but the increase was relatively lower than in the whole of England and Wales. The death-rates ranged amongst the rural districts from 24.06 in Llanrwst to 15.38 in Conway, and amongst the urban districts from 30.15 at Bethesda (which had also in 1877 the highest death-rate) to 17.45 at Dwgyfylebi. Eleven of the districts had death-rates below, and five rates above those for 1877. Out of the total number of 3,307 deaths, 323 were from the principal zymotic diseases—diarrhœa being accountable for 79, whooping cough for 76 deaths. Scarlatina was much less fatal than in 1877, 36 deaths being registered from it; but typhoid fever caused no less than 49 deaths, and diphtheria 36. The largest outbreak of the former disease was at Bethesda, where 11 deaths occurred. This district has been allowed to remain in a most disgraceful state of neglect. Mr. Rees reports that a large proportion of the houses are without privies, that no method is adopted for the removal of excrement, that the drainage is exceedingly defective, and that the water-supply is derived from shallow surface springs, liable to all sorts of pollution. The local authorities have now been roused, however, to a sense of their position. An epidemic of diphtheria of extraordinary virulence raged at a terribly neglected place called Penmachno, and carried off twenty-one persons, mostly children. Sanitary work appears to be progressing throughout the district, though in some places the action taken is somewhat tardy. At ten places drainage works are in a more or less forward state, and at seven the works have been completed; whilst at about fifteen places a water supply has been provided. Much more, however, yet remains to be done in these respects, and in securing a better system of excrement removal. At Bethesda, Llandudno, and Pwllheli, many of the houses are without any sort of privies or ash-pits; pigsty nuisances are rife at Bangor and in the Carnarvon rural district, whilst at Pwllheli the common lodging-houses are reported as disgracefully out of repair, filthy, and overcrowded.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

Local Rates.

1878. *Albion Steel and Wire Co., Re.* The Rule in bankruptcy giving Local Rates priority over other debts of a bankrupt ("Bankruptcy Act, 1879," s. 32) does not under the "Judicature Act, 1875," s. 10, apply to the case of a Company in liquidation. (47 L.J., Ch., 229; L.R., 7 Ch.D., 547; 38 L.T., 207.)

Rating of Owners.

1878. *Bennett* v. *Atkins.* "Poor Rate Assessment Act, 1869," ss. 3, 4, and 7—A notice in writing by an owner that he is willing to be rated in respect of his hereditaments, whether occupied or not, is a condition precedent to a greater abatement than 15 per cent., and cannot be waived by Overseers—Therefore, where there was an allowance of 25 per cent., which was irregular, the franchise was not preserved for the tenants. (48 L.J., C.P., 95; L.R., 4 C.P.D., 80; 40 L.T., 66; 43 J.P., 191.)

House unfit for Habitation.

1879. *Brown* v. *Biggleswade Union.* "Public Health Act, 1875," ss. 91, 97-8—House unfit for habitation—Order of Justices that the Local Authority might abate the nuisance (the owner having failed to do so)—Whereupon Authority pulled down the house—Action in County Court by owner against the Authority—Nonsuit—Held that the Authority was justified in pulling down the house on the Justices being satisfied that it was unfit for habitation, and the owner refusing to repair. (*Times*, May 19, 1879.)

Landlord and Tenant.

1879. *Castleberg* v. *Kenyon.* House with defective drains and water supply—Notices to abate nuisance served by Local Authority on occupier, and proceedings against same—Work done by occupier, who claimed repayment from owner in County Court—Occupier held entitled to reimbursement by owner. (*Times*, June 16, 1879.)

Locomotives on Roads.

1879. *Davis* v. *Browne.* "Locomotive Act, 1865:" "Highway Act, 1878, s. 29—Traction engine—Third man in front with flag exhibited on a pony cart, he himself being in charge of the cart—Justices considered that a man so occupied was not free to give help to the engine if required, and convicted the engine-driver of travelling without his proper complement of helpers; but the Superior Court quashed the conviction. (48 L.J., M.C., 92; 40 L.T., 557; 43 J.P., 416.)

Club.

1879. *Dawkins* v. *Antrobus.* "Travellers' Club,' London—After plaintiff was elected a member, Rule passed empowering a meeting to expel a member—Plaintiff expelled under this Rule—Held that as during the four years the new Rule had been in force plaintiff had taken no steps to challenge it, it must be deemed binding on him by acquiescence—Publication by plaintiff of pamphlet libelling another member—Held that if the members at large deemed the publication of such a pamphlet to be "injurious to the character and interests of the Club", the Court would not interfere with their discretion. (*Times*, June 24, 1879.)

INFECTIOUS HOSPITAL.

1879. *Hill* v. *Metropolitan Asylum Managers.* "Metropolitan Poor Act, 1867," 30 Vict., c. 6—Infectious hospital built under the Act, and at the instance of the Local Government Board—Action by adjacent landowners—Held that the Act did not make the defendants irresponsible agents exempt from liability—And that they were not exempt on the ground that they only obeyed the directions of the Local Government Board, and acted *bonâ fide* in the discharge of a duty cast upon them by Statute. (48 L.J., Q.B., 562; L.R., 4 Q.B.D., 433; 40 L.T., 491.)

UNSOUND MEAT.

1879. *Reg.* v. *Blount.* "Public Health Act, 1875," s. 117.—Summons against a butcher for exposing unsound meat for sale—Summons dismissed on proof that defendant did not know the meat had been brought upon his premises—Whereupon second summons for the offence of having the meat on his premises—Conviction—Conviction quashed as irregular, the offence charged under each summons being substantially the same. (43 J.P., 383.)

MAGISTRATES AND NUISANCES.

1879. *Reg.* v. *Weymouth, J. J.* "Public Health Act, 1875," s. 258.—Proceedings by a Local Authority against a person for a nuisance—Conviction—Of the Magistrates sitting on the Bench when the case was heard, 3 were members of the Local Authority—Held that notwithstanding the Magistrates in question had taken no active part in the hearing, yet they were interested—Accordingly, Rule absolute for *certiorari* to quash the conviction. (48 L.J., M.C., 139; [*Reg.* v. *Milledge*], L.R., 4 Q.B.D., 332; 40 L.T., 748; 43 J.P., 606.)

OBSTRUCTION OF FOOTWAY.

1879. *Reg.* v. *Wigan, J. J.* Conviction by Justices of a householder for obstructing a footway by furniture—Allegation that no part of the *public* footway was obstructed—merely an open forecourt—Conviction quashed by *certiorari.* (43 J.P., 220.)

RATING APPEAL.

1879. *Reg.* v. *Wiltshire, J. J.* 27 & 28 Vict. c. 39, s. 1—Poor Rate—Appeal—Next practicable Sessions—Computation of time—An appellant who has given notice of objection to a Valuation List, and failed to obtain relief before a Rate is made in conformity with the List, is not bound to give a fresh notice of objection to the List after the Rate is made, in order to be entitled to appeal. (48 L.J., M.C., 142; L.R., 4 Q.B.D., 326; 40 L.T., 681; 43 J.P., 654.)

ACCESS TO SEWERS.

1879. *Swanston* v. *Twickenham L. B.* Sewer constructed along public road with man-hole on plaintiff's land—Man-hole erected without leave, and yielding noxious smells—If such a structure is necessary, the Board may construct it without purchasing a site for it, the landowner being entitled to compensation only. (48 L.J., Ch., 623; L.R., 11 C.D. 838; 40 L.T., 734.)

LANDLORDS' LIABILITIES.

CUTLER *v.* MANTELL.

This was an action (heard before Mr. Justice Fry in the Chancery Division on the 16th ult.) to set aside an agreement for the lease of a house at Hanwell, on the ground of misrepresentation in the matter of drainage and water-supply, and for consequent damages. Negotiations were entered into between Captain Cutler, the plaintiff, and a Mr. Hill, a house agent at Hanwell, with respect to the letting of the house. The house was not in Mr. Hill's hands, but his lordship thought his agency was adopted. Mr. Hill stated, in reply to a question by Captain Cutler on the subject, that the house was drained into cesspools; but on the 22nd of March 1878 he wrote to Mrs. Cutler as follows:—'When I met Captain Cutler to-day in the City I was in error when I stated that the drainage is into cesspools. It seems that the drainage from the house enters the main drainage in the road, and, I believe, is partly or entirely discharged into the river Brent. Mr. Mantell states that no drains go under the house.' Mrs. Cutler, during the negotiations, wrote a long letter to Mr. Mantell, inquiring specifically as to many matters about the house, and stating that there had been illness and death in the house, caused by bad drainage, and they were naturally anxious on the subject of drains. Mr. Mantell wrote an answer dealing with her questions in detail, and stated, among other things, 'There are no cesspools on the premises'; 'the closets are supplied from a separate cistern to that for domestic purposes.' Captain Cutler eventually took the house, and some of his family went into possession on the 30th of September 1878. In October one of his children died in the house, of diphtheria, and his sister-in-law died early in November of the same complaint, also on the premises. He removed, and brought this action, alleging, by his statement of claim, that he was induced to take the house by the representations made in the two letters above referred to, and that the representations were false. It turned out, according to his lordship's view of the evidence, that at the time of the bargain the drainage of the house was in a transition state. There were some old cesspools on the premises which had been disconnected from the house. There was still in use a cesspool, not on the premises actually occupied with the house, but under a piece of land over which there was a right of way; this was connected with the new drainage. His lordship considered this cesspool on the premises, even in a strictly legal meaning of the word, as being appurtenant to the use of the house. There were two cisterns in the house, one of which, besides supplying more than one water-closet, supplied all the water for domestic purposes.

The defendants denied misrepresentation and the agency of Hill. In order to show that diphtheria could not have arisen from any imperfection of drainage, they called Dr. Semple, who had made diphtheria a special study. He reiterated a statement contained in his published work, that 'locality appears to have no influence upon the organisation or the disappearance of the disease. The weak and the strong seem to be pretty equally liable to its attacks, and the want of sanitary precautions does not tend materially to develop its presence, nor do the most carefully-devised hygienic precautions prevent its appearance.'

Mr. Justice Fry, in giving judgment, said that the defendant, Mr. Mantell, had made statements (he was happy to say he believed not knowing them to be untrue) which ought not to have been made in answer to such inquiries as were made, and in such circumstances, without informing himself of the truth of them. He might have given instructions as to alterations of the premises; but it was his duty, and

not the less so because he was an architect, to have known what the circumstances were. The other defendants had left the matter in his hands, and, therefore, no judgment could be given against them. His Lordship gave damages for rescission of the contract, and directed an inquiry as to damages against Mr. Mantell.

THE SPREAD OF INFECTIOUS DISEASES.

At the East Riding petty sessions, George E. Boynton was charged before the magistrate for that he, being in charge of a person (his apprentice) suffering from an infectious disorder, did wilfully expose such sufferer, without proper precautions, in the public streets. On behalf of the York Union Rural Sanitary Authority it was stated that a young man apprenticed to, and who resided with, the defendant, was suffering from scarlet fever, which had also attacked a member of the family, and that the defendant ordered the apprentice to go home, the consequence being that he traversed on foot part of the city and part of the suburb while in a condition dangerous to the well-being of the community. The apprentice stated that his master told him he might go back to bed or go home if he wished, and he chose the latter. He told his mother that he had been ill of the fever for three weeks. In answer to defendant's solicitor, witness said he did not know when he left defendant's house that he was ill of scarlet fever. The defence set up was that the defendant was not aware of the apprentice's illness, and that he had not ordered him away. The Bench inflicted a mitigated penalty of 2s. 6d. and costs.

FROST AND WATER-SUPPLY.

The Secretary of the East London Waterworks Company was summoned at the Thames Police Court for unlawfully neglecting or refusing to supply a sufficient quantity of water to a number of industrial dwellings, the rates for such supply having been duly paid. There were over fifty summonses issued against the company, but only one was fully entered into, which was for an inadequate supply of water on the 2nd of December to two large blocks of buildings in Commercial Road East, thereby causing the occupants considerable inconvenience and expense. The company's defence was, that on that particular day the frost was exceptionally severe, and a large number of persons, to prevent the water freezing and the pipes bursting, allowed their water taps to run continually, thereby lessening the full pressure of water-supply, although no proceedings appeared to have been taken against the parties for such wilful waste. Mr. Lushington, after hearing evidence on both sides, said he could not have any doubt that on the 2nd of December the company did not supply the north side of the buildings in Commercial Road with water. It was not denied the two cisterns which supplied the dwellings in question were forty feet from the pavement, in accordance with the Act, and that the inhabitants, having duly paid up their rates, were entitled under the Act to get a proper supply of water. He fined the company £10 for the offence committed on the 2nd of December. He proposed to inflict the penalties respecting each case with regard to the north block of buildings, and respecting the south side the summonses would stand adjourned *sine die*, to see if the company gave a sufficient supply of water to both sets of buildings from the present time.

CELEBRATED LEICESTER PORK PIES.

At the Leicester Borough Police-court, Messrs. Viccars Collyer and William Dunmore, the manufacturers of the 'celebrated Leicester pork pies,' were charged with having in their possession a quantity of beef for the purpose of preparation for the food of man unfit for human food. Mr. John Ward, inspector of food, stated that he noticed a butcher on the premises of the defendant cutting up part of a hind quarter of beef for the machine, and examined the meat, which he found to be in bad condition, very much diseased, and full of tubercles. He further found eight quarters of beef, of which two of the fore-quarters corresponded with the two hind-quarters which had been cut up. There were a number of tubercles on the beef, which was quite unfit for food. The quantity seized was 8½ cwt., and the number of pieces 25. Dr. Johnson, assistant officer of health, spoke to having examined the beef, which was totally unfit for food, scarcely an ounce being good. The magistrates fined each of the defendants £10 for each of the ten large pieces, making £100 in all, or in default of distress three months' imprisonment.

REVIEW.

Pay Hospitals and Paying Wards throughout the World. Facts in support of a rearrangement of the English system of medical relief. By HENRY C. BURDETT, Secretary of the Seamen's Hospital Society, Greenwich. London: J. and A. Churchill, 1879.

Mr. Burdett's labours in the cause of pay hospitals are too well known to need mention at our hands. To him is due the origin and subsequent development of the Home Hospitals Association, and he is generally recognised as the authority on the particular subject to which the present book relates. Mr. Burdett is extremely earnest in his advocacy of the system of payment—at any rate in part—for the benefits received in hospital, and he vigorously denounces the evils to which the present indiscriminate system of medical relief gives rise. He examines carefully, and with much painstaking detail, the working of the various systems of pay hospitals in vogue in France, Switzerland, Germany, Austria, Spain, Italy, Sweden and Norway, America, Canada, and the Colonies; and he expresses the opinion, in which we cordially concur, that middle-class or pay hospitals, if established in England on a proper basis, would probably become very popular and financially successful. In support of this view, he gives the opinions of gentlemen, who have given special attention to this particular question, and he also goes at great length into the reasons which make such hospitals desirable. No one, indeed, can rise from a perusal of Mr. Burdett's statements without feeling that the establishment of pay hospitals and pay wards would meet a real want in this country. Hospitals and hospital treatment are undoubtedly becoming more and more popular with the general public, and this result is hardly surprising. But it is none the less a grievous scandal that those who can afford to pay should be allowed to go to these establishments to the exclusion of their poorer neighbours without in any way contributing to the funds of the hospital. Mr. Burdett proposes that whilst poor persons who can afford to contribute something towards their maintenance should be treated in

the wards of the present general hospitals, the remunerative paying patients should be treated in separate hospitals of their own. In this way he would get over a difficulty which has been felt by many to be a great stumbling-block in the way of the extension of this desirable reform; and the arguments adduced in favour of this plan are certainly very cogent.

Mr. Burdett gives an interesting account of a now forgotten institution, the first Pay Hospital established in England, by Dr. Southwood Smith in 1840, together with a critical and exhaustive discussion of the efforts recently made by the treasurer of St. Thomas's Hospital to engraft the system of pay patients upon that institution. A lengthy chapter is devoted to the Home Hospital Movement, in which Mr. Burdett is more particularly interested. The importance of the objects which this useful society aims at fulfilling is very well brought out. We are gratified to find Mr. Burdett insisting strongly on the provision of hospitals for infectious diseases for the well-to-do, and of convalescent hotels, the need of both of which is now very grievously felt. The Home Hospitals Association, and the cause of pay hospitals generally, has a very earnest and powerful advocate in Mr. Burdett, whose book should be in the hands of every hospital manager in the country who desires to rescue the institution in which he is interested from the chronic impecuniosity to which but too many hospitals seem to be subject.

Plumbing: a Text-Book to the Practice of the Art or Craft of the Plumber, with Supplementary Chapters upon House-Drainage. By W. PATON BUCHAN. London: Crosby Lockwood & Co.

This volume was originally the outcome of a series of papers which appeared in the *Building News*, commencing at the close of the year 1871, and which was subsequently published in book form in 1876. This edition having been sold out, the author has been induced to write a second one—that under review—and he has not only embodied in it various improvements introduced within the last few years, but he has appended some detailed remarks upon the subject of house-drainage.

The chief value of this work consists in the fact that it is the only handbook we know which is specially addressed to the use of plumbers, and where the apprentices of that craft can learn, from a practical authority, what to do, and what practices to avoid. It commences with constructional matters, such as the plumbing of gutters, ridges, flushings, flats, and roofs, and then passes on in due order to rain-water, waste and soil-pipes, water-closets, urinals, baths, lavatories, and kitchen sinks. He also supplies valuable information, in succeeding chapters, respecting cisterns, pumps, rams, and syphons. There is also a very instructive chapter upon the flow of water through pipes. The rest of the book is usefully taken up with a dissertation upon drainage, and here the improved systems find adequate attention.

We confidently recommend Mr. Buchan's book to the attention of the craft. Much valuable information upon his own patents and their working will be found in the chapters which form the peroration to the original edition.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

SANITARY CONGRESS AT CROYDON.

Lee Conservancy, 12, Finsbury Circus, E.
18th Nov., 1879.

We are requested to publish the following correspondence which has taken place between Major L. Flower, Sanitary Engineer to the Lee Conservancy Board, and Mr. Bailey Denton, in reference to statements in a paper read by the latter, entitled, "Remarks on certain points in the work of the engineer which have a direct bearing on public health," and published in our issue of Nov. 15, 1879.

MAJOR FLOWER TO MR. BAILEY DENTON.

My dear Sir,--Although I was informed of your paper at Croydon, I regret that I was not there to hear it and comment thereon. I feel it my duty to refute, in as public a manner as possible, the part which refers to the powers, duties, and actions of my Board—and how in the face of the eternal facts which I am daily putting forth, and the public notices which have been from time to time posted in the watershed, you could have made such assertions it is impossible to conceive. I enclose you copies of two of the notices, and you will see that 'all streams or watercourses flowing directly or indirectly into' are noted, or, as I daily put it, every ditch is under my charge. The watershed of the Lee is the only entire watershed in charge of a Board, and I am the only officer in charge of a watershed, and further, I try to do my duty.—Very truly yours,

LAMOROCK FLOWER.

J. Bailey Denton, Esq., Whitehall Place.

MR. BAILEY DENTON TO MAJOR FLOWER.

22 Whitehall Place, S.W., 19th Nov., 1879.

My dear Sir,—I am very sorry there should be any misunderstanding about the meaning and object of my remarks at Croydon, as to the discharge of sewage into the tributaries of the Lee. Had I ever seen the printed notices you have now been kind enough to send me—which I had not—I should have qualified my remarks, and I regret that I was not able to do so. They were based on the facts (first) that when I drew the attention of the Local Board of Stevenage to the illegality of discharging the sewage of that place into the present outfall, I was met by a declaration by one of the members of your Board—who addressed certain letters to the local papers (you will remember the circumstance)—that the Lee Conservancy had no jurisdiction over that outfall, and (second) that nothing has been done, within the five years that have since elapsed, to prevent the discharge referred to. I am quite sure of one thing, that you personally are most anxious to do your duty, and one of my objects in saying what I did was to strengthen you in the exercise of those duties which I, rightly or wrongly, considered were restricted to certain limits. I have done all I possibly could in Stevenage to bring about a proper system of sewers and sewage disposal, and I verily believe that there is not a more unpopular man at the present moment than myself, simply because I have done what I considered right in this respect. If you will kindly look back to our former correspondence on this subject, you will better understand the grounds of my statement, and give me credit for no wish to misrepresent the state of cir-

cumstances or to imply any disrespect to yourself.—Yours faithfully,

J. BAILEY DENTON.

Major L. Flower, Sanitary Engineer.

MAJOR FLOWER TO MR. BAILEY DENTON.

Lee Conservancy, 12 Finsbury Circus, E.C.
20th Nov., 1879.

My dear Mr. Bailey Denton,—Thanks for your letter of yesterday. You are too great a man not to acknowledge an error when you have made one. I quite remember the letters to which you refer—neither my Board nor myself sanctioned them, and I regret you did not more fully become acquainted with the facts before you read your otherwise admirable paper at Croydon.—Very truly yours,

LAMOROCK FLOWER.

J. Bailey Denton, Esq., Whitehall Place.

VENTILATION OF ROOMS.

I fear that for practical service the plan described by Dr. Stainthorpe, at page 201 of your November issue, is far behind the plan shown on page 161, and which has been in use for seven years in Councillor Smith's own dining-room. I placed a 'sheet of metal' with a 3 in. hole in centre in front of the space under the bars of the grate in my office to-day, and the anemometer indicated 75 ft. of lineal speed; but when I enlarged the hole to 6 in. square, the anemometer stood still. Of course, with all the ashes continually removed, a somewhat better result would be given; but still the plan is far inferior to Mr. Smith's. An improvement upon Mr. Smith's plan—which is in one of my patents—is to have the inlet of the foul air from the room directly above the gasalier, so as to carry off the foul air from gas-lights before it has time to get diffused over the room. The outlets into vents, etc., being generally placed below the cornice, allows from 6 in. to 9 in. or so of heated air to be generally over the whole area of the room under the ceiling. This should be avoided as far as possible.

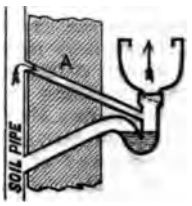
W. P. BUCHAN.

Glasgow, 4th Dec., 1879.

VENTILATION OF SEWERS BY SOIL PIPES.

I beg to support Mr. Rogers Field's opinion that soil pipes should not be used to ventilate the public sewers, and consider with him that Mr. Bailey Denton's recommendation to do so 'is a serious mistake'.

In his book on 'Sanitary Engineering' published in 1877, and at page 67, Mr. Denton says:—'It is desirable, if it can be effected without nuisance, to disconnect the soil-pipe of water-closets from the sewer by a trap arrangement effecting a break in its continuity outside the dwelling; but there is so much probability of an evil arising, sooner or later, from the use of such disconnecting traps, which would in itself be as great as that which it is intended to remove, that I consider it better not to break the continuity of the soil-pipe of water-closets, but to trust to well-devised double-trapping, with proper ventilation of the soil-pipe and closet trap—see Fig. 2, Drawing 1—to prevent the escape of sewer gas into the dwelling,' etc. Now I consider Mr. Denton altogether wrong in his ideas here. In objecting to disconnecting traps he conjures up before his imagination a 'lion in the path', where, in reality, there exists only the shadow of a mouse! To understand the real value of his remarks, however, we must examine his 'Fig. 2, Drawing 1,' to which he points as the 'proper' way to do things, but upon looking at it we find that his plan is a very *improper* one, and one the absurdity of which was explained by me at page 192 of *The Building News* for May 17th, 1872, and also at page 96 of my book on 'Plumbing', published in 1876. Mr. Denton's sketch shows a valve water-closet with a lead siphon trap underneath it to keep back the sewer air, but any good this siphon trap would do is completely nullified by the ventilating pipe which he puts in above the inner or house side of the trap, and which he connects directly back to the soil-pipe! As Mr. Denton's book is often referred to I here give a sketch of his drawing where the pipe A* joined to the inner side of the trap is what I object to. This bad style has really been carried out at some houses; only this week a Glasgow master plumber was telling me that he had an example in a west end house shortly since, where it was supposed a first-class job had been made. From the foregoing I think Mr. Denton should think over matters again, and understand the fitting-up and real requirements of soil-pipes and water-closets a little better before he again advocates a soil pipe being open to the public sewer. He is going dead against the rule in the model bye-laws of the Local Government Board, and fails to bring forward a single sensible, scientific, or practical reason for doing so. I have had a good deal of experience with all sorts of soil-pipes for above twenty years back, and instead of allowing sewer air to go up a soil-pipe, I will not, if I can help it, even allow the air from the house drain to do so. In this I seem to be more particular than Mr. Field, but I think that recent medical investigation and my own experience go to prove this to be the safest and best plan, and I am very glad indeed to see Mr. Eassie, at page 182 of your issue for November 15th, 1879, advocating the use of ventilating traps at the foot of soil-pipes, and also at page 183, approving of 'the disconnection of the house drains from the sewer', and in such a way as that fresh air may be taken in at the disconnecting traps in order to allow currents of air to go through the drain and pipes and be discharged at the ventilating pipes.



The shorter the length of close soil-pipe between a water-closet and the fresh air the safer the water-closet, and especially if the work has been done as above recommended. It must be remembered that even fresh air entering at one end of a long soil-pipe comes out stinking air at the other end, and the longer and closer the soil-pipe the stronger the stink. With a disconnecting trap at its foot, however, disease germs from either sewer or drain are kept out, which is a great benefit.—W. P. BUCHAN.

21, Renfrew St., Glasgow, 27th Dec., 1879.

* The arrows shown in sketch are added by me.

VENTILATION OF SEWERS & SOIL PIPES.

Will you allow me a word regarding the difference of opinion which appears to exist between Mr. Rogers Field and Mr. Bailey Denton. I believe I was the first to induce a public body to insist upon the ventilation of soil-pipes, I argued the necessity for it at the Social Science rooms many years ago as one of the first principles of drainage construction.

I wish therefore to say that whether soil-pipes are used for the purpose of ventilating the public sewers or not, they must be ventilated themselves for the protection of the inhabitants of the house against the possibility, nay, the certainty, of stagnation of air which would exist in the soil-pipe if ventilation was not provided. I should hope that the time is past for local authorities to neglect the ventilation of public sewers, so that soil-pipes need not be called upon to act as ventilators, but if they do so it will be far safer for the public than to allow ill-constructed public sewers to be unventilated, and sewer air to become concentrated for mischief in any given district. I say 'ill-constructed', because a properly constructed public sewer—unless a part of an ill-constructed system—will not contain materials giving out dangerous sewer air. It will only be in districts which are wrongly advised that sewer ventilation will be neglected. Hence, whilst it is necessary for the latter to be done, it is quite as necessary for the former, and if either are omitted there is a weak point in the arrangements both of the house and of the district. It may be argued that the architect has nothing to do with the district, his duty is with the house alone. I think this is a mistake. The architect ought to see that the sewer with which he proposes to connect his house is a properly constructed sewer. He may interpose a trap between his house and the sewer. If he does, and he does not provide for the ventilation of the intermediate portion of the drain, he is committing an error, whilst if he does provide for it he is making two openings where one is sufficient. If the sewer is an inherently bad one I think the double safeguard is an advantage, but if it is not so there is no advantage in the intermediate trap; it may itself become a danger.

ALFRED CARPENTER, M.D.

Croydon, Dec. 20th, 1879.

WOOLLAMS' NON-ARSENICAL PAPER HANGINGS.

IT has been our duty so often to call attention to the ill-effects experienced from the vapours and solid matters disengaged from arsenical paper-hangings, that we are glad to be able to indicate a source where our readers, and the public generally, can obtain perfectly innocuous wall-coverings of the best description. Nor is this desideratum accomplished with any sacrifice of beauty. Messrs. Woollams, of High Street, Marylebone, have succeeded in producing wall-papers of the best descriptions and qualities, and of the most artistic designs and colours, which, by the adoption of vegetable instead of poisonous mineral dyes, are as harmless to health as they are satisfactory to the eye.

NOTICES OF MEETINGS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting of the Society of Medical Officers of Health will be held on Friday, January 16th, at 7.30 p.m., at 1, Adam Street, Adelphi, when a paper will be read by Dr. Tatham (Salford), 'On Certain Reforms which appear desirable in the Statistical Reports of Medical Officers of Health.'

A DICTIONARY OF SANITARY APPLIANCES.

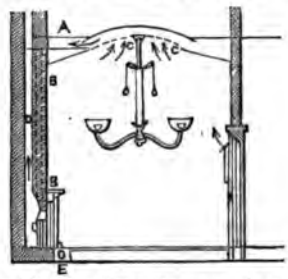
BY W. EASSIE, C.E.

(*Continued from p.* 162.)

AIR.—XXIX.

OUTLETS (*continued*). — Memorandum. I am greatly obliged by the letter of Dr. Stainthorpe, given in the issue of November 15 last, having reference to Councillor Smith's system of withdrawing the heated air of rooms, and I am sure that the system described by him would perform excellent work. I will further extend my remarks upon this plan by pointing out how Mr. Buchan has proposed to render it available in carrying off the products of gas-combustion from an ordinary gasalier, before they have had time to become diffused through the room, thus assisting ventilation.

The ceiling is here coved somewhat, preferably in the centre, and pierced with a great number of holes,



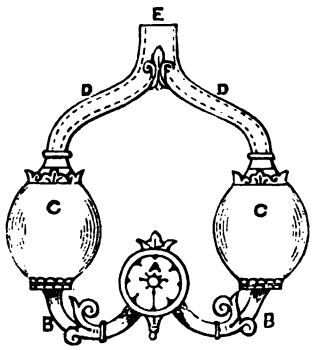
Buchan's proposed Ventilated Gasalier. C, perforated coving leading foul air to pipe A; D, chimney; B, B, pipe in plaster with valves; E, fresh air inlet to fire.

having, moreover, a large metal basin above the centre of the gasalier, placed between the joists. From off the side of this basin, nearest the chimney, a metal pipe is taken, say, 9 in. × 6 in., or more or less, which is led along horizontally to the ceiling, and then turns down vertically at the back of the plaster, for instance, to, or near the floor of the room, where it passes in behind the grate, whence the vitiated air entering at the soffit of ceiling finds its way up the chimney. This plan would, of course, work best when the fire was alight; but when the fire is not in use, and if the chimney be surmounted by a proper ventilator, an up-current will be promoted, especially if the grates are tightly fitted in. It might also be advisable to supply air from the house exterior to the front of the fireplace.

An eminently improved system of withdrawing the products of combustion, and the heated air due to the use of gas in rooms, has just been invented by Messrs. R. Boyle and Sons, the sanitary engineers of Glasgow. The objectionable atmosphere is here removed by the use of double pipes, with cones placed below, or immediately over the lights, the space between the two pipes being filled with a suitable non-conducting substance. These tubes are branched together into a main tube, which surrounds the carrying tube of the gasalier, and the heated products are finally led to the outer air in the most simple manner by a special pipe, upon the summit of which is placed one of Boyle's air-pump ventilators.

The inner pipe leading from the gasalier, in this system of gas-product withdrawal, is one inch in

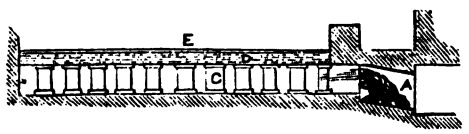
diameter, the outer one being one inch and a half. The condensed vapour in the pipes is caught in a



A. Boyle and Sons bracket gasalier ventilating tubes. A, bracket; B, gas supply; C, globe; D, branch ventilating tube; E, main ventilating tube to shaft.

gutter or trough, which encircles either the bottom of the gutter or the cone. Such water cannot accumulate to such an extent as to overflow, as it will be continually evaporating, owing to the rapid passage of air caused by the suctional action of the air-pump ventilator. The chief thing intended by Messrs. Boyle was to prevent the pipes removing the heated air acting as heaters of the air, and so making matters even worse than before. All other inventors who have sought to remove the products of gas, or other combustion, have recommended single pipes; and the idea of using double pipes, with intermediate suitable packing, so as to prevent radical heating, is due to Messrs. Boyle.

Warming of Air in Rooms and Delivery of Warm Air.—The most ancient method of performing this was by means of the hypocaust, remains of which are to be seen in many of the Roman villas, that have



Section of Hypocaust, after Bernan. A, fire-hearth; C, pillars; D, tile courses under floor; E, tesselated or other flooring.

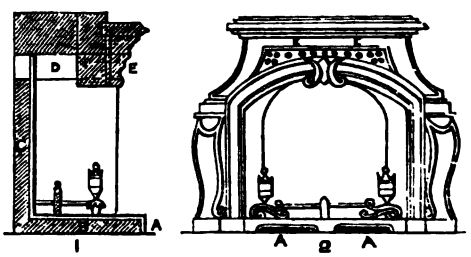
been brought to light in our own country. The one discovered at Lincoln contained four rows of brick pillars, about 9 inches apart, and each rested on a tile, as well as having another tile for its capital. The ceiling was formed of bricks, and upon these were placed courses of tiles, mortar bedded, which was again covered with stucco. The entire thickness of the floor itself was 10 inches, and the depth of the heating chamber about 26 inches. To secure a heated current through the flames an extra large space was provided for the combustion of the wood and the entrance of the air. This hypocaust was also, it is thought, occasionally made to do duty as a deliverer of hot air to some distance from the main chamber.

The system, therefore, of providing warmed air to rooms must be of very ancient date, and was introduced to provide against the many inconveniences which followed the use of the open brazier.

Seneca, who lived about 50 B.C., mentions that in his time many inventions were brought out, as for instance, the insertion into walls of pipes from hypocausts in order to spread an equal degree of warmth throughout the room, and heat below as well as above. The hypocaust was constructed in the usual way in the basement, and pipes of baked clay were built into the walls, their lower ends open to the hypocaust, and the top ends led into the room with movable closure discs. Speaking of this plan, M. Bernan says that the covers were not opened until the wood was charred, and then the system was objectionable, as the charcoal vapour would be offensive to most persons. But had the closures upstairs been kept on until all the fuel was consumed and then opened, the method would have been less objectionable, and the rooms even ventilated.

The supposition that the hypocaust was made at times to supply warm air was confirmed by an examination of some flues in the Roman villa discovered at Woodchester, when flues, undiscoloured by smoke, were found, and evidently intended to convey occasional currents of hot air to the rooms above the hypocaust, so as to preserve the magnificent flooring. In this villa, each room had its separate hypocaust, and would have been warmed independently. Every now and again, even yet, inventors are busying themselves with the best means of leading air into rooms which has been warmed in some suitable chamber. Among the last in the field, which we have noticed, is Mr. Pritchett of Bishop Stortford, who provides in his hollow tiles, walling, and flooring for the conveyance of warm air to the various rooms.

About the year 1685, Louis Savot describes a fireplace in the Louvre at Paris, which proved that an



Fireplace for the Louvre, 1685. A, cold air entry; B, space under floor of hearth; C, hollow ascending pipe; D, passage towards hot air delivery at E.

ordinary fireplace had even then been adapted to the delivery of warmed air into an apartment. It was evidently a fairly successful attempt at altering the old fireplace and andirons. At all events it was the forerunner of the very many modern improvements in what are now called ventilating grates or stoves, possessing hot air chambers and valved deliveries.

In the fireplace described by Savot the cold air from the room entered into a space underneath the hearth, and the latter being heated, the warmed air produced in this way ascended in two hollow flues, one on each jamb of the mantelpiece, and was delivered into the apartment in the frieze of the mantel. These hot air deliveries were made to open or close at option.

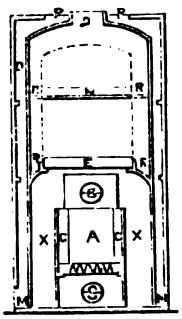
The most wonderful work ever produced upon fireplaces, was one written by Cardinal Polignac in 1713, and published by him under the assumed name of Gauger. I have also seen the Amsterdam reprint and the translation by Dr. Desauguliers into English in 1716. This treatise enters very largely into the matter of heating in caliducts placed behind the fire, and he furthermore devised a very ingenious three-way cock in order to regulate the admission of the hot air at will.

In the Polignac fireplaces, an imperfection, says

Bernan, lay in the fact that in meandering through the caliducts the heated fresh air was deprived of its due velocity, and thus but a small portion comparatively was delivered into the room, at a somewhat greater heat, instead of a large quantity, with a lower and more agreeable temperature. But this is only one of the objections which might be offered. Dr. Arnott for his part, declares that if the air be overmuch heated when it enters a room, it has been shown that it does not sufficiently diffuse itself in the present air of the apartment, but rises at once, and is speedily lost, by passing away unmixed in the ventilation system.

A ventilating stove, an improvement on the Dutch stove, is described by Mr. Tomlinson, and it possesses several peculiar features. The fire-chamber is enclosed in fire-tiles, and between it and the inner casing of the stove is a space of about 4½ inches. Above the upper edge of the fire-box a large fire-tile is placed upon brackets, leaving a ¼ of an inch of space all round, so as to allow the hot vapour of the fuel to rise upwards. Eight inches above the last-named tile is an iron plate, loosely supported on brackets, past which the vapour still rises, and as the roof of the stove is arched to the foot of the smoke-pipe, it will be seen that the stove is composed of three chambers, the one containing the fire-box, and the others for utilising all the heat from the ascending vapour. The stove is also enclosed in a plate-iron casing, and between the inner casing and the outer one is a space of 1½ inches, up which the air is always coursing—being taken from the room at the foot of the stove and delivered at the top of the stove.

In a stove of this description, mentioned by M.

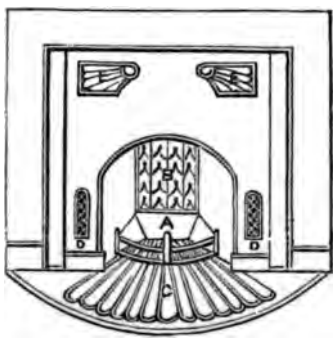


A, fire-chamber with tiles C; X, space between fire-chamber and inner casing; E, tile division across stove, with iron division above again at H; R, R, brackets to rest divisions upon; D, smoke flue; O, space between inner and outer casing; M, cold air inlet; P, warm air delivery; S and B, valves for admitting air into stove chamber.

Improved Dutch Stove, after Tomlinson.

Bernan, where the heating surface was only 20½ square feet, and the depth of coke about 5 inches, it was found quite sufficient for a room containing 5,600 cubic feet of space.

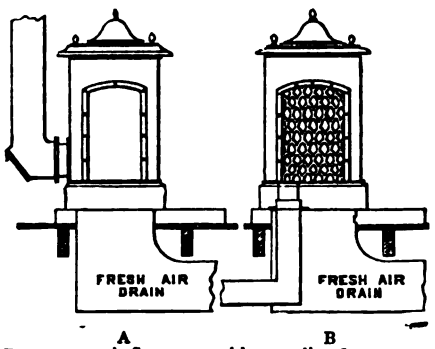
It will be noticed that the air which is warmed in



Sylvester's Ventilating Stove. A, fire-box; C, radial bars; B, Venetian plates for smoke exits; D, intake of air; E, delivery of hot air.

the foregoing fire-grates is derived from the room itself, and is not supplied from the external atmosphere. Of this same character was the grate introduced by John Sylvester in 1832. It was uniquely constructed in other ways, having louvred openings for the smoke-exit and radial bars on the hearth. The air was taken in at the foot of the grate and delivered from the two upper corners of the stove front.

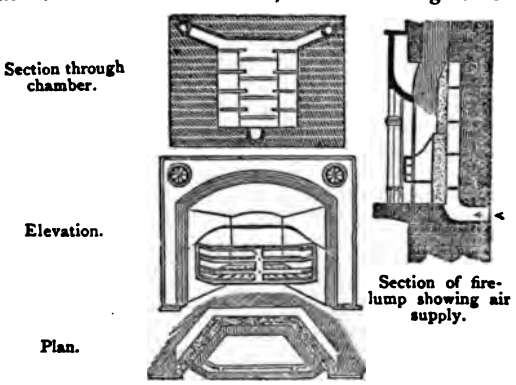
Warming of Air brought from Without and Delivery into a Room.—This is an alteration upon merely heating the air, which is found at the floor-level, and bringing it out heated at the mantel jamb or freize, and has not been very long practised. Among



Pyro-pneumatic Stove. A, with ascending flue; B, with descending flue.

the first to introduce it was Mr. Pierce of London, in his pyro-pneumatic stoves. The principle upon which these are constructed, is that of using fire-lumps as the best medium for the transmission of heat by radiation from the open fire, and the distribution of warm atmospheric air through the building. It consists of an open fire surrounded by Welsh lumps, which are perforated or hollowed out by vertical air passages. The whole is enclosed in an outer casing, which may be plain, or decorated. A channel communicating with the external atmosphere admits air to a cavity in the lower part of the casing, connected with the mouths of vertical channels in the lumps round the fire. In this way a succession of warm air is given to the apartment.

A system of building up a complete fire-grate with fire-lumps has long been in use, and they are also made with air-chambers or baffles behind, in order that fresh air can be taken in, and after being some-



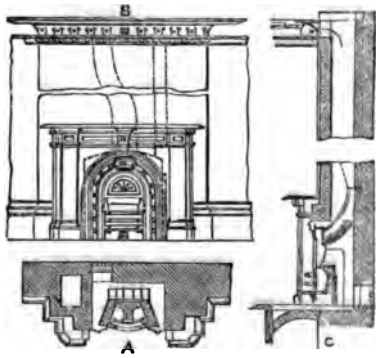
Fire-lump built Grate with Air Chamber.

what heated delivered in continuous currents into the room.

They are made in loose parts, and the only iron-work about them consists of the bars of the grate. I have used them with success. The air is not over-heated, and the supply is controllable by a regulating valve placed in the upper corners.

There is somewhat of a controversy as to whether the air enters a room more fit for inhaling when heated in a chamber having iron gills. At all events both fire-clay and iron have their partisans. The great bulk of the fire-lump stoves are objectionable, and the freight is also heavy. Hence, many ventilating grates have been introduced with iron chambers.

The best known grate of a description uniting both iron and fire-lumps is the ventilating fireplace devised by Capt. Douglas Galton, F.R.S. Copious supplies of fresh air pass through the grating at the back of the chamber, and when warmed in the latter, it rises up the hot air-flue leading out of the top of the chamber, and is delivered into the room near the ceiling-line, or elsewhere as may be desired.



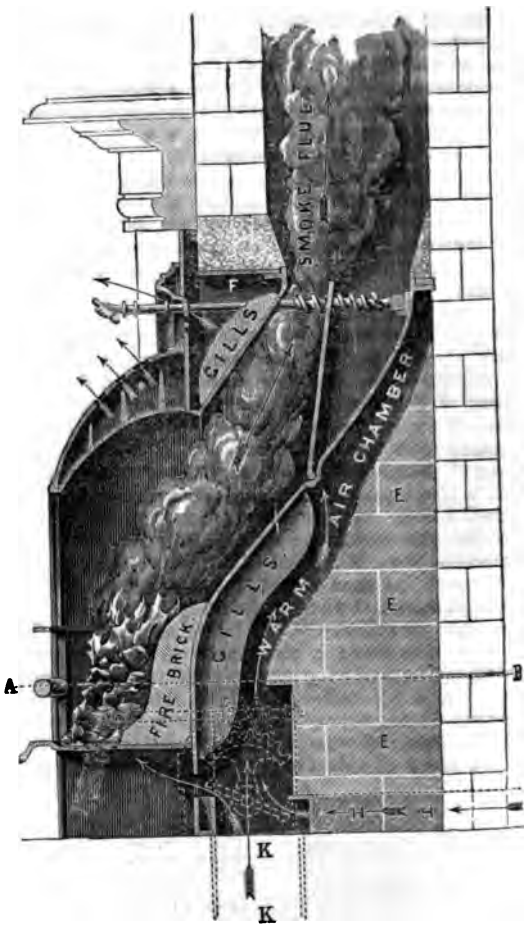
aptain Galton's Vertical Stove. A, plan; B, elevation; C, section.

The smoke-flue has no connection with the hot air flue, and if the grate has been properly fixed, nothing can work better. It has stood endless tests, and will perform the hardest work with the minimum attention. Its performances have been carefully summed up by General Morin.

The bulk of the ventilating grates of the present day deliver the warmed air either under the mantel or in the space formed around the grate itself. In the Thermoson grate, which I have largely used, the fire-basket, lined with fire-brick, is made to project, and is provided with a movable iron canopy, having gills upon it. The back of the fire-basket has the arch of the stove cast upon it, and has also projecting gills behind. By this arrangement an increased heating surface is secured, thus warming the air coming in contact therewith. Apertures in the arch and front, communicating with an air chamber formed of brick-work behind the stove, provide for the free circulation of heat, and for the necessary supply of cold air. A valve is provided, by which the draft can be regulated at pleasure, either to the air chamber or to the fire.

There are several peculiarities in the Thermoson which can be sufficiently explained by a study of a large-sized section.

Satisfied with the success of the Galton ventilating stove, great numbers of inventors specially interested in stoves and grates, and also many amateurs, have devised articles of varying excellency. It would be impossible in my articles to find room for descriptions of these, and I have therefore described three of the earliest and best. I can, however, mention by name



E, E, E, air chamber formed of brickwork; F, F, covering-in plate, resting on bar G to render the joint airtight.

Whitwell's Save-all-Waste, the Wharncliffe Grate, Corbett's Economic Ventilating Grate, Armstrong's Abbotsford Pattern, Pope's London Grate, Dovey's London School Grate, Longden's Patent Fire-grate, Shillito and Shorland's Ventilating Grate, Lewis's pattern, Wadsworth's Metropolitan Grate, and Griffiths' Heat-Retaining Stove, as all taking in air from external sources, and admitting it in a warmed state into the room, chiefly from the chimney-piece level. Some other patterns have ceased to attract the public, owing to their defects in working.

It may be objected to, that in these papers I do not become sufficiently critical, and do not distinctly specify what is good, and what is only approximately so. But this must be left to the concluding articles, if by that time I have been enabled to venture upon such a course by satisfactory evidence. I wish to bring to view all the most useful contrivances under each head, but may possibly omit some, in which case I would paragraph them in future articles. And I here ought to add, that it is no easy matter to speak justly as to the priority of invention on the part of manufacturers. Some things are, however, very plain. For instance, the 'costless ventilation' idea, applied to a window, is due to Dr. Hinckes Bird; and the air-pump fixed ventilator, in which radial, tangential, and other plates were used, was, as I mentioned in Article XX, first of all introduced by Messrs. Boyle of Glasgow. It is, however, a

all times, puzzling to discover the first inventor; and in this our Patent Laws are mostly to blame. The department is not bound in any way to sufficiently search the past, to see if the specification presented is in any way novel, and this causes much confusion.

(*To be continued.*)

SANITARY INVENTIONS.

THE PATENT IMPERIAL WINDOW.

We have had the opportunity of inspecting a new invention, having for its objects the removal of the necessity for male or female servants to sit or stand outside windows when cleaning them, and the more easily controlled and complete ventilation of apartments. A large number of accidents annually occur in consequence of persons engaged in window-cleaning losing their hold on the sash and falling; the Imperial window, however, renders it unnecessary for any one to incur any risk of the kind. It consists simply of an ordinary sash, swinging on a support on each

THE NEW SYSTEM.

side in the same manner as the ordinary toilet-glass. These supports, or swivels, may be fitted to any sash at present in use. The only other alteration necessary is the fitting of a narrow slip of wood at each side; the swivels are screwed to these, which are so arranged as to slide up and down with the aid of the pulleys and weights already fixed at each side of the

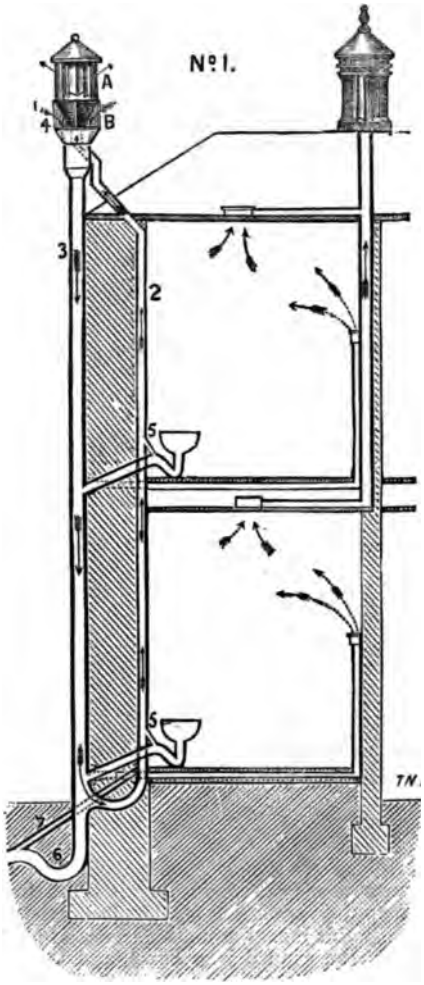
THE OLD SYSTEM.

sash. It is to be understood that both upper and lower sashes are fitted in this way. The advantages are twofold: the window can be instantly reversed for cleaning, from the inside only, and no danger incurred, whilst as a simple means of securing ventilation, this form of window has a decided advantage over the old-fashioned sliding-sash. The upper sash being raised, say two inches, is inclined at a slight angle, the upper portion towards the street; we have then a space at the bottom for the entrance of a current of cold air, which will be deflected to the ceiling, and a similar aperture for the escape of vitiated air. The principle of the invention, while theoretically correct, has been found excellent in practice, sufficient ventilation being obtained without draught. We may add, in conclusion, that the adoption of this invention entails but the outlay of a few shillings per window, and that the necessary alterations do not interfere in any way with its appearance; on the contrary, the effect produced when the new-fashioned sashes are open is good. To prevent the possibility of children or incautious people meeting with accident by pushing against the lower sash, a couple of small bolts may be fitted where it is thought necessary to do so. Mr. U. Knell, 37, Wood Street, London, is the inventor and patentee.

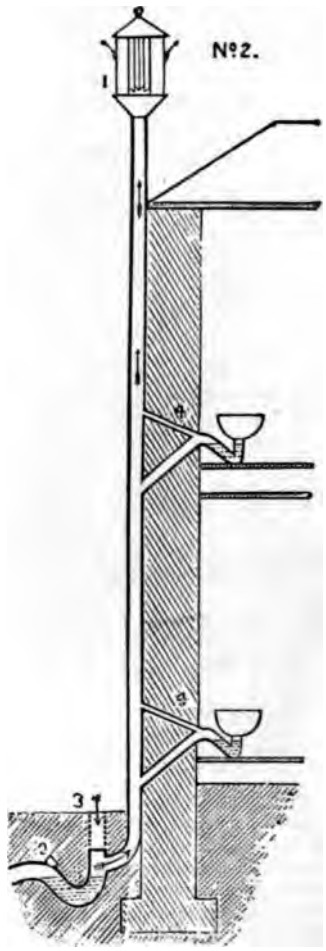
BOYLE'S DOUBLE ACTION SOIL PIPE VENTILATOR.

Messrs. Robert Boyle and Son, of Glasgow and London, have, by a combination of their 'Air-Pump' ventilator and a downcast ventilator also patented by them, produced a soil-pipe ventilator which for efficiency and simplicity cannot well be surpassed. As shown in diagram 1, figure 1, the upper portion of it marked A consists of the air-pump or extracting ventilator connected with the upcast ventilating pipe 2. The downcast ventilator, B, forming the lower portion, communicates with the soil-pipe 3. From the arrangement of the plates, or divisions 4, it presents an open mouth (on the principle of the windsail) to the wind from whatever quarter it may blow, forcing it down the soil-pipe and up the ventilating pipe, as indicated by the arrows. By this means a double power is obtained, the force of the wind driven down, and the suction of the extracting ventilator keeping the soil-pipe thoroughly aërated and perfectly free from poisonous gases, which are not allowed for a single instant to lodge or accumulate in the pipe. This ventilator has also the great merit of being a fixture, with nothing movable to get out of order or make a noise. The fact of the air inlet being at such an elevation insures a supply of air and a force not attainable at a lower level, as may be easily proved by going on to the house-top, where a current is almost certain to be felt, though at the time it may be perfectly calm in the street. Supposing, merely for the sake of illustration, there was not a movement in the air—a state of matters which according to high scientific authority never exists—with this system there would still be a through current on the syphon principle, owing to the mouth of the downcast pipe being lower than the upcast. Both pipes may be placed inside the house or outside, as preferred, or the soil-pipe may be fixed inside to protect it from frost in the winter time. There would not be the slightest danger, however, in having it in the house with the double action ventilator applied. It is shown by Messrs. Boyle placed outside, so that the upcast pipe may have the benefit of the heat in the house, which tends to rarify the column of air, and which also derives a greater velocity from the colder and

heavier air in the outside pipe rushing towards it, and forcing it out at the top. These conditions



alone assist greatly to maintain a continuous through current, independent of the force of the wind. Figures 5, 5, 5, are ½ inch pipes, to ventilate the discharge pipes connected with the water closets, and prevent the traps being unsyphoned by the passage of matter down the soil-pipe. Figure 6. The drain trap. Figure 7. 2-in. ventilating pipe, connecting drain with upcast pipe, where no provision is made for ventilating the drains separately. This arrangement of Messrs. Boyle and Son is so very simple and easily understood, that its utility must be at once apparent to even the most uninitiated; and, therefore comes within the range of really genuine and useful sanitary reforms. Mr. R. P. Beattie, plumber and sanitary engineer, Edinburgh and London, has used these double pipes very extensively, and we understand they have been found to answer exceedingly well. He uses the air-pump ventilator for creating an upward current; but the double action ventilator will now of course answer his purpose much better. It is also shown in the diagram how Messrs. Boyle and Son ventilate the water closets by means of one of their air-pump ventilators placed on the roof, with a main pipe let down the wall, and connected by means of a branch pipe with the centre of the ceiling, the fresh air being admitted through a vertical tube placed against the wall, close to the door, so that the current of air will always have a direction from the door to the ventilator, which from obvious reasons is the proper direction. The vertical tube is connected underneath the floor with an opening through the wall, communicating with the external air. Diagram 2 shows the system of soil-pipe ventilation which is



at present most extensively used by the leading sanitary engineers. Figure 1 is a Boyle's patent air-pump ventilator, 10 in. diameter, for creating an up-draught and preventing down-draught, which it has been found to do most effectively, the highest testimony being given in its favour. It is now too well known to all in any way interested in these matters to require a further description. Figure 2. The drain trap. 3. Fresh air inlet to soil-pipe, by which means a through current is established. The ventilators are shown larger in proportion than they would be in reality, for the purpose of making their construction plain and more evident.

THE SANITARY INSTITUTE OF GREAT BRITAIN.

The sum of £200 has been offered by the Rev. E. Wyatt-Edgell, through the Sanitary Institute of Great Britain, for the best essay that may be sent in by the 1st of August next, on 'The Range of Hereditary Tendencies in Health and Disease'.

ORIGINAL PAPERS.

NOTES ON INDUSTRIAL DWELLINGS.

By ELIJAH HOOLE.

II.—GENERAL ARRANGEMENT.

NEXT in importance to the selection of a suitable site is the arrangement of the dwellings to be erected upon it. Would that every man who plans or builds a house could realise that for a century, perhaps, the health or disease, the comfort or squalor, the crime or innocence, of the inhabitants depend largely upon his careful planning and sound construction of their dwelling. It may be safely asserted that no such thought ever enters the head of the ordinary speculating builder, by whom the great proportion of the houses inhabited by the artizan class are—not built—but run up. To him a house is so many rods of brickwork, feet of timber, and yards of plastering, at so much, which, when completed, will cost so and so, and let for a sum representing a very large percentage on the outlay, after providing for the ground rents. Whether the tenants live or die, thrive or pine, is not his business—he puts up houses to sell, and when they are sold *caveat emptor!*

The ideal of a labourer's home is the 'lonely cot' described by Burns, though we must enter a protest against the 'hawkie' 'yont the hallan', presuming that the poet intends to indicate that only a partition intervenes between the cow-shed and the living room. At first sight it would seem that the best mode of lodging the working man would be to give him a cottage to himself, quite away from any other dwelling, and standing in about half an acre or so of garden. Then he could grow his own fruit and vegetables, there his wife could dry the clothes, and there the children could play. No doubt such a plan would have many advantages, though with the drawbacks of extreme distances to be traversed by the labourer, both to work and to market. In the country it is practicable enough, but in a good situation in town half an acre of ground would cost ten thousand pounds or so, which would be a high price for the garden of a single cottage. The only possible method of building labourers' dwellings in town is, therefore, that of grouping them together. Putting a number side by side and joining them is the simplest form of grouping; but still too much land is used in proportion to the number of tenements placed upon it. A second storey of cottages has to be added, and then a third; but the ground rent will still be excessive, and the buildings will be lower than most town structures. It is only when four and perhaps five tiers of cottages are placed one above another that the proper proportion between the ground rent and the rent of the tenement can be maintained. These tiers of cottages one above another form what is usually termed a *block* of industrial dwellings, and, if properly arranged, are both convenient and healthy. Convenient, because coals, water, dust-shoot and all appliances ministering to comfort and health are brought much nearer to the occupant of such a tenement than to the tenant of an ordinary dwelling-house, and healthy, because a free circulation of air and a more complete immunity from effluvium, dust, and contagion is enjoyed than can be secured by the inhabitants even of middle-class houses. The block being detached, and wide open spaces being left round it on all sides, the air not only plays freely round it, but passes completely through it, by the back and front windows, the passages, and the staircase. At the same time each tenement is as distinct as though it was a house in itself. Those on the ground-floor are entered by street doors from the pavement, and for those above the street, pavement is repeated at each floor in the shape of a stone balcony. Street doors open out upon the balcony on each floor, and thus the upper tenements are as distinct as those in the street below. Access to the balconies is given by a broad staircase reaching from the ground to the roof, and entirely open, at least on one side, to the free air and light. Each step should be broad and not high, with a good hand-rail at each side for the use of children and of old people. It is preferable, too, that no windows should open out upon the staircase, that it may not convey the air from one tenement to another. Some of the earlier industrial dwellings were built with sets of rooms opening direct from each side of a corridor which led to the staircase. This plan is obviously bad, since foul air must pass along the corridor from room to room. The inhabitants are brought too closely into contact, and the independence of the separate dwellings is destroyed. Instead of being tenants of separate cottages, the dwellers in such a building are but lodgers in a large house. An arrangement of this kind is hardly any improvement upon the present system of crowding a number of separate families into a house meant for one. The more distinct and independent of each other the separate tenements can be made, the more thoroughly do they answer their purpose, and the more completely are the health and comfort of the tenants secured. The number of tenements reached by one staircase must be regulated by the funds at disposal, it being borne in mind that the fewer there are to one staircase the better. Staircases occupy space, are costly to construct, and do not bring in any rent. There may, therefore, be too many of them for the financial success of a building, though there can hardly be too many for the convenience of the tenants. The ideal arrangement would be to give a separate stair to each tenement above the ground level.

A flat roof forms the best covering to a building of this class, as it not only utilises the space which would otherwise be lost by the erection of the building, but is easily reached for inspection, and, if properly constructed of iron and concrete, is both incombustible and much more durable than a wooden roof covered with tiles or slates.

No living rooms or bed-rooms should be formed below the ground level. This is often done in dwellings of the kind referred to, in order to reduce the outlay, but never with real advantage. It is next to impossible to keep such rooms dry, and they are always without their proper share of air and light. Besides this, in such under-ground rooms foul air collects and stagnates, forming a kind of atmospheric cesspool, which there is no means of emptying.

If in a good thoroughfare, the ground floor may be usefully occupied by shops of a good class, which can be entirely distinct from the workmen's dwellings above, and, by bringing in a considerable rental, will make it possible to build on good sites with a prospect of a fair return for the capital expended. It is an error to suppose that the rents paid by the working population are too low to pay for good rooms in good thoroughfares. They are quite sufficient to do this, and the driving back of

the lower class into narrow courts and alleys is quite unnecessary. We are so accustomed to see the poor living in narrow streets, that we are apt to fancy there must be some real need for it. But there is none; and the rents paid for these miserable habitations are quite sufficient to pay for light and healthy rooms in a wide thoroughfare. More than this—it is frequently possible to buy up squalid property of this kind, and to rebuild it so that the rent of the new building pays not only for itself, but for the old dens which have been removed to make way for it.

As to size in each block, the limit fixed by the Building Act, of 3,600ft. area, or 216,000ft. cube for content is a convenient one, and for such a block a single good staircase may be made to serve. With additional staircases and party walls the blocks may be indefinitely increased in size; but, from a sanitary point of view, separate blocks with intermediate spaces are far preferable.

When the buildings are extensive, too much care cannot be given to the grouping of a number of blocks. The aspect should be carefully considered, and as much sunlight as possible should be allowed to enter the rooms. Nothing can compensate for the lack of sunlight in a living-room, or can be an efficient substitute for the salubrity and cheerfulness which it brings with it. Although the direction of the principal streets in the neighbourhood will to some extent govern the position of the blocks, much may be done by keeping the aspect in view, and by the size and arrangement of the windows. It is in this matter of arrangement and in the due provision of light and air that large sites have the advantage over small ones. There is less restriction, and far greater advantages can be secured for the tenants.

A quadrangular grouping round a central garden has many advantages, insuring, as it does, a broad central space for the back windows to look out upon, while the entrances to the staircases, and consequently, to all the upper floors, may be made through a single gateway in one side of the square, and trespassers easily excluded. Such a square should have openings at the angles between the blocks forming each side, in order to avoid any stagnation of air in very close or still weather.

MEAT AS FOOD FOR MAN.

By Junius Hardwicke, F.R.C.S., Eng., L.K.Q.C.P. Irel.
Medical Officer of Health for Rotherham Boro'.

When we remember that the quality of our food is one of the most important agencies which affect nutrition, and that Professor Gamgee has calculated that about one-fifth of the whole amount of meat brought into the London market is diseased, the urgency of the question, 'what is fit for human consumption, and what is not?' cannot be over-estimated, and in proportion to the correctness of the views which the medical officer of health holds, will be his usefulness, and the amount of protection which he is able to afford to those whose welfare he is entrusted with. I propose to limit my observations to the subject of flesh meat, as to whether it be fit or not, when purchased at the shambles, for human consumption, excluding entirely from our consideration those meats which are idiosyncratically productive of disorder in certain individuals; although eaten with impunity and advantage by the mass.

Dr. Letheby says, 'I feel that the question of the fitness of meat for food is in such an unsettled state, that my action in the matter is often very uncertain, and I should like to have the question experimentally settled. As it now stands, we are either condemning large quantities of meat, which may be eaten with safety, and are therefore confiscating property and lessening the supply of food, or we are permitting unwholesome meat to pass almost unchallenged in the public markets.' It is true that savage tribes eat with impunity rancid oil, putrid blubber, etc.; and in our country game is also eaten whilst undergoing rapid putrefactive change. Still, there is abundant evidence to prove that serious consequences from putrid and otherwise unsound meat are of frequent occurrence, and, in all probability, a large proportion of cases of obscure disease owe their origin to the same cause.

Dr. Parkes truly observes, 'It is only logical to conclude, from general principles, that as all disease must affect the composition of animal flesh, and as active putrefactive change must, at all events, lessen its nutritive value, it is of the utmost importance for health that these substances should be obtained in as sound a condition as possible; and there are numerous cases recorded in which putrefactive changes in meat have produced serious disease, such as vomiting, diarrhœa, and low fever. It is well known that putrid sausages are essentially dangerous.'

Another condition of otherwise good animal food may be mentioned here, viz.: that induced by frequent and large bleedings, in order to bleach the flesh—as is practised previous to slaughtering calves in England. In this case, the removal of the alkaline blood will cause the development of acids, and give rise, in many persons, to severe griping pains and diarrhœa.

Examination of meat.—1st. According to Dr. Wilson, good meat on section should present a marbled appearance, from the intermixture of streaks of fat with muscle, showing that the animal has been well fed. 2nd. The colour of muscle should not be too pale, nor too dark. If pale and moist, it shows that the animal was young or diseased; if dark or livid, that the animal was not slaughtered, but died with the blood in it. 3rd. Both muscle and fat should be firm to the touch, not moist or sodden, and the fat free from hæmorrhagic points. 4th. Any juice exuding from the meat should be small in quantity, of a reddish tint, and give a distinctly acid reaction to test paper. Should dry on the surface, after standing a day or two. 5th. Muscular fasciculi should not be large and coarse, no mucilaginous or purulent looking fluid should be detected in the cellular tissue. 6th. The odour should be slight, and not disagreeable; disagreeable odour shows either commencing putrefaction or disease; by chopping meat into small pieces and drenching it with warm water, the odour is more readily detected. The microscope will show small cysticerci and trichinæ. Brain and liver should be examined for hydatids; lungs for abscesses and grapes; ribs for pleuritic adhesions. Mouth, stomach, and intestines, for cattle plague, (also the flesh which is soft and dark, and has a glairy appearance).

Letheby says it is the practice in London to condemn the flesh of all animals which have died from natural causes or accident, those infected with parasitic disease, or which have been suffering from acute febrile or wasting diseases.

We now proceed to the effects of diseased meat on

* Read at the Meeting of Yorkshire Medical Officers of Health, January 29, 1880.

the system. And here the evidence is of the most conflicting character. According to Dr. Letheby, enormous quantities of the flesh of animals that died of rinderpest in 1863, and more recently of pleuro-pneumonia, have been sent to the London market and eaten without having produced any tangible effects, and it is well known that the Scotch eat braxy mutton with impunity, and some say even prefer it to the sound. The symptoms or complaints of those supposed to be suffering from the ingestion of diseased meat are very similar to those occasioned by the use of putrid meat. But parasitic disease is quite different. The cysticercus cellulosus of the pig produces in man the tænia solium; that of the ox or cow the tænia medio-canellata. The trichina spiralis in pork produces trichinosis, a complaint characterised by symptoms very like those of typhoid fever—enteric irritation, loss of appetite, diarrhœa, irritation and pain in the muscles, fever, sweating, anasarca, diminished secretion of urine and sleeplessness.

Dr. Parkes says the diseases of cattle which the medical officer should watch for are:—1st. Epidemic, pleuro-pneumonia, otherwise called lung disease, pleura, new disease, new delight (Yorks.). Epizootic, pleuro-pneumonia and pulmonary murrain, not easily recognised at first, but with marked lung symptoms after a few days.—2nd. Foot and mouth disease or Eczema epizootica, Eczema contagiosa, murrain, aphtha; a highly contagious and infectious febrile disease with a vesicular eruption in mouth, between digits of the foot, and around coronet and teat of mamma.—3rd. Cattle plague, typhus contagiosus, steppe disease, or rinderpest. [First brought to England in 1848, either by two calves imported from Holland by a farmer near Poplar, or, as some say, through hides by a tanner, first reported by commissioners in 1845, broke out again in 1863. These three diseases come under the head of contagious diseases in a work written by Professor Williams, of the Veterinary College in Edinburgh.]—4th. Anthrax: malignant pustule, carbuncular fever, erysipelas carbunculosum, quarter-evil, joint murrain, or black quarter, recognised by lameness in one or both hind quarters, with tenderness in loins and back, and swellings with emphysematous crackling succeeded by small scurfy patches of dead skin and gangrene of limb [I should here wish to add splenic apoplexy or braxy, which kills 50 per cent. of all the sheep which die in Scotland]. Gamgee considers this a kind of anthrax which should be placed under the head of septic diseases, and with all other septic diseases of Great Britain should be watched for by the medical officer.] —5th. Simple inflammatory affections of lungs. (This complaint, if of recent origin, before caseation of the inflammatory products has occurred, and not of the glanderous or contagious form, I can scarcely regard as very objectionable.).—6th. Dropsical affections from kidneys or heart disease.—7th. Indigestion with apoplectic symptoms. These three last diseases come under the head of sporadic disease in Dr. Williams' work.

I should suggest the propriety of adding to the list of contagious diseases the following, as horse flesh may be sold as beef, and glanders may be communicated to cattle which are offered for food:—1. Glanders: inoculable, infective, and contagious, and even through stomach by introduction of discharge in the form of balls, which has occurred. Symptoms: Rigors, sanguineous discharge from nostrils, temperature often as high as 106-107, breathing rapid, ecchymoses, ending in ulcers; submaxillary glands enlarged, suppurating, and bursting, with discharge from eyes. 2. Farcy, like glanders, highly contagious and infectious; fever, with swelling of legs, and farcy masses, and when swelling of cellular tissue subsides, farcy buds from swelling of absorbents. 3. Puerperal apoplexy, dropping after calving, milk fever. 4. Rabies (symptoms): Excited wild manner, bellowing, running about wildly and at everything within reach when fits come on, and separating from herd, discharge of saliva. 5. Cow pox or Variola, vaccina, a contagious, febrile, and eruptive disease, from specific poison, which is reproduced and multiplied in the animal. The morbid poison causes an eruption, and destroys the susceptibility of the affected animal to another attack. It is not necessary here to argue the point, whether small-pox in man and cow-pox are identical or antagonistic.

I should also add a list of epizootic diseases:—1st. Measles in pig, caused by presence of cysticercus cellulosus, discovered by dragging out tongue, then looking and feeling for sublingual vesicles containing cysticercus cellulosus, and by cutting out a bit of the muscle under the tongue with a small harpoon, and placing it under the microscope. This entozoon produces tænia solium in man. The cysticercus bovis produces the tænia medio-canellata, and the trichina spiralis produces trichinosis, attacking muscles or, more correctly, the intermuscular cellular tissue. 3rd. Rot, fluke disease, from the distoma hepaticum which Gamgee found in the liver of sheep: tissue found wasted, pale, flabby, and watery. I have had three sheep brought under my notice lately of this disease, two of which I condemned as unfit for food. The animal is said to swallow the cercariæ, the embryonic stage of the distoma, from the herbage. 4th. Gid, turnsick, staggers, or sturdy, caused by the development of the tænia cænurus cerebralis in the brain. Dogs become infested with tapeworm by introducing into their digestive organs the embryonic form of the parasite which exists in the brain of sheep given to them or thrown in their way, and the sheep suffer from the entrance of embryos which are expelled from intestine of the dog. 5th. Phthisis in the cow is of two kinds: phthisis verminalis (so-called phthisis, the husk, hoose, or parasitic bronchitis), from the presence of a worm called strongylus filiaria, producing irritation in lungs or bowels, according to its situation. Hoose is produced in calves from strongylus micrurus; in pigs from strongylus suis; in poultry (termed the gapes) from sclerostoma syngamus. The first form of phthisis in a cow is from the presence of a worm called strongylus filiaria, found in bronchial tubes, and in lung substance in lambs; in sheep in the parenchyma of lungs, giving them the appearance of being filled with small tubercular deposits, thickly covering the lungs with small nodules of the size of a pin's head to size of hempseed and larger, and resembling small blisters; some are filled with fluid, others with soft material consisting of granular matter, others hard and gritty. All contain minute worms coiled upon themselves; now and then they cause debility, anæmia, and death, especially in lambing ewes. The second form of phthisis, and that which has its homologue in man, is characterised by caseous tumours called angleberries or grapes, and in Scotland, clyers, varying from the size of a pea to a hen's egg or larger. When cut into they invariably contain caseous with calcareous matter, and microscopically consist of shrivelled cell elements, oil globules, cholesterine, and lime salts. This condition arises from previous

pleuro-pneumonia, and is often connected with lameness from tubercular inflammation of joint.

The diseases of sheep are similar to those of cattle. Small-pox in sheep is easily known by the flea-bitten appearance of skin in the early stage, and the papulæ and vesiculæ subsequently. Sheep are also subject to erysipelas carbunculosum, and chronic lung affection, from the strongylus filiaria. Pigs are subject to anthrax and typhoid, and hog cholera; perhaps the latter is the same as typhoid.

Dr. Parkes speaks of recognising these diseases during life, but it is, I think, mainly with the diagnosis after death that we have to do, as we are generally informed by our meat inspector, when called upon to give our opinion as to the fitness of meat for food, to what disease the animal was subject during life.

Most medical officers of health present will endorse the theory, that as a general rule contagious diseases are communicable by contact, by inoculation, and by infection. If so, we cannot, I think, permit these three classes of diseased meat to go forth to the public as fit for human consumption; but I know what the reply of those who take a different view will be—viz., that the process of cooking will destroy the contagium and render the meat fit for use. To these, I should say, you have no proof that such destruction occurs; meat subjected to a temperature of 160°, which I believe will thoroughly cook it, may, I think, still be productive of disease in man by inoculation. We are yet ignorant of the nature of contagium, and if it be a living germ, what proof have we that, even if we succeed in destroying this germ, and the Entozoon of parasitic disease, a possible potent matter produced by the germ or ova of entozoon may not still exist and possess infective qualities. Dr. Williams, speaking of rinderpest, says any liquid from the body of an animal suffering from this disease serves to communicate this disease by inoculation. Sheep kept closely housed with the diseased cattle will be almost sure to catch the plague. It is true that we have no account of the inhabitants of Paris having suffered from diseased meat, which must, we should suppose, have been consumed during the late siege; but when we remember that specific disease poisons all lie latent in the system for a certain but varying period, before diseased actions are set up, and that the phenomena resulting from their action vary according to the dose, and the susceptibility of the patient and, therefore, are not often traced back by the sufferers to their real cause, I think we must not place too much dependence on the fact that we have no report of such occurrences. Professor Gamgee, speaking of puerperal apoplexy, says it is marked in cattle by the development of a poison capable of inducing a similar disease in other animals, of affecting the human frame, and rendering the flesh of animals unfit for human food. I don't think that any gentleman will for one moment think of suggesting that Mr. Gamgee never contemplated cooking the meat before eating it, and that if he had he would not have condemned it for food. At all events, I think that doubtful meat should be sold as of inferior quality, and precautions taken as to cooking, and then the worst effects might not occur; but it should be sold at a lower price, and then a question may arise whether a benefit may not occur from the fact that those who are badly in want of animal food, but who cannot afford the higher price, may be able to obtain it at a lower price. Still it is obviously to my mind the duty of the health officer to condemn it, when sold under a fictitious character, and as Dr. Wilson says we know, whether we introduce the disease which the affected animal has been suffering from or not, that a specific cause will diminish the quantity of fibrine and produce general deterioration of the blood, consequently of the nutritive value of the tissues.

The following are the symptoms of the different diseases, taken from Dr. Williams' able work:—

Rinderpest.—Lies dormant for about seven days; animal dying on third or fourth day. Spasmodic twitchings of voluntary muscles, especially of neck and shoulders, and hind quarters; tremors, coat-stares, back arched, legs gathered up under body, but seemingly not much acute pain, rumination suspended, appetite fails, water well taken to end, temperature variable, slight increase at first, but soon chilliness, then death, coldness of ears and legs, and horns towards termination; pulse at first not much disturbed, then a little quickened, and gradually less in force; respiration not much altered, flanks work, discharge early from nostrils, cough only heard when near patient, and of a singular sound, like what would occur in a broken winded horse with sore throat, discharge from eyes, bowels not disturbed at first, but soon abdominal pain and diarrhœa, then dysentery to end. If he attempts to move, staggers and dies from prostration.

Erysipelas Carbunculosum begins with inflammatory fever, neck extended, head nearly horizontal, eyes protruding, red muzzle, dry, nostrils expanded, breath hot, root of horn hot, mouth partly open, pulse full and hard, breathing quick and laborious, flanks violently heaving, moaning, disinclined to move, if he attempts to do so, staggers; appetite gone, rumination ceases, although he drops; animal either dies or recovers a little, and some symptoms appear, from which disease is called; he is lame in one or both hind quarters, tenderness of loin and back, swelling about shoulder, back and loins, with crackling, emphysematous noise; then appear hard, scurfy patches of what looks like dead skin, gangrene sloughing rapid and extensive, producing ulcers, urine dark or bloody, dung bloody and fetid; patient probably dies.

Puerperal Apoplexy, from brain congestion. *Symptoms:* restlessness, with peculiar movement of hind quarters and weakness, breathing a little hurried—the animal falls—pulse quick and full, hind legs now, if pricked with a pin, insensible to pain; pupils dilated; after a time, brain more affected, head either obstinately pressed to side or thrown back, with horns resting on ground; eyes may be touched with finger, so insensible; breath stertorous; swallowing power gone; obstinate constipation from first, then blood-vessels of brain injected, and sometimes rupture of their coats, with effusion and softening, or effusion of serum between membranes in ventricles.

Splenic Apoplexy, or Braxy. Symptoms: animal dying in twenty-four hours; back arched, staggering; and twitching of muscles, blood-shot eyes, quick pulse, frothy saliva from mouth, breathing difficult, paralysis, diarrhœa; animal dies in convulsions.

Fluke Disease. Symptoms: Flukes found in liver of sheep, in a perfect condition, with organs of generation developed or developing, and masses of ova surrounding the parasites. They are often packed together in scores, in saccular dilatations of gall ducts. Ova pass through intestine of sheep, and fall into stagnant pools, ditches, etc., or are washed from land during rains in streams; many hatched and embryos develope and move freely, owing to vibrating cilia; they are eaten by mollusks, the common

physæ or limnea of pools. They here acquire a sort of hydatid form, provided with alimentary canal and organ of locomotion. By a process of internal budding, cercariæ form, these are the young sucking worms, which have a rudder tail, like a tadpole, and can swim, and find their way to water, where they live free, until some favourable crustacean or mollusk appear, into which they pass by means of spines developed on their head. They lose their tail and become encysted; their internal organs continue to develope, and on the animal they infest being accidentally swallowed by a sheep, etc., they escape free to pass into the liver, acquire generative organs, and lay eggs. These metamorphoses are probably similar for all trematode worms, and are presumed to be those of the distoma hepaticum of Gamgee, and the 'Fasciola' of Williams, whose cercaria form has not been discovered. Sheep, at first, thrive well, and lay on fat; inactivity and dulness soon apparent, flanks hollow, back rigid, and decided yellow colour of eye; fleece drops off in patches, belly enlarges, back droops, there is a disposition to dropsical swellings in parts of body, especially about throat; sheep said to be chockered, blood is deficient in albumen, which causes watery part to exude through vessels. Tissues are wasted, flabby, pale, and watery. There is also a want of the firmness and healthy colour of mutton.

SELF-ACTING INTERMITTENT SYPHONS.

By FRANCIS T. BOND, M.D., B.A. Lond.

THE paper with the above title, by Mr. Rogers Field, which appears in the *Sanitary Record* of December 15th, 1879, deals with a subject of considerable practical interest, and as it propounds a device which its author appears to think will overcome the difficulties which have hitherto interfered with the utilisation of siphon action in many cases where it would be most convenient to employ it, the paper deserves careful attention on its own part, even if the well-known name of its author were not sufficient of itself to command it. It is somewhat unfortunate, however, that Mr. Rogers Field has omitted from his paper the consideration of the conditions in which such a siphon as he describes may be called upon to act, as it is scarcely possible to discuss its merits without taking into account its relations to the size of the vessel in which it is placed, and to the rate of influx into it. Stated in its simplest and most practical form, the problem with which we are called upon to deal in cases in which an automatic siphon is desired, is the following: given a reservoir of liquid, supplied by a stream of the same liquid running into it at a uniform rate, it is required to apply a siphon to it of such a kind that it shall entirely empty itself periodically. Now, before considering the special conditions with which we have to deal in this problem, it will, perhaps, not be amiss to say a few words on the action of the siphon by itself, as, unless this is clearly appreciated, the problem enunciated above can scarcely be satisfactorily attacked.

In the first place, it is well to note that, so far as carrying power is concerned, a siphon is simply a pipe serving as the outlet to the reservoir in which it is placed. It is, therefore, amenable to the ordinary laws governing the carrying power of pipes, one of which is, that no pipe, the calibre of which is not uniform throughout, will carry a larger volume of liquid per unit of time than can be transmitted in the same time through its narrowest part. Hence any construction which diminishes the calibre of a siphon in any part of its course must be looked on as actually lessening the carrying power of the siphon to that extent.

In the second place, as it is important to the spontaneous action of a siphon that the column of water in the short leg shall, when it passes over into the longer one, entirely fill this latter, so that all air may be driven before it, it is essential in such a siphon, either that the calibre of the long leg shall not be greater than that of the short one, or that, if it be, the liquid shall be driven up into the short leg with sufficient force to cause it to expand and fill the long leg as soon as it enters it.

Thirdly, as the source of the carrying power of a siphon lies wholly in its long leg, it is only with this latter that we have practically to deal, the only function of the short leg being to carry the water into the long leg, and the only condition governed by it being the depth of water in the reservoir which the siphon will exhaust.

Now, the carrying power of a siphon is not a constant quantity, being determined by the formula: $k = c(h + e)$ where c is the calibre of the long leg in its narrowest part, h the height of water in the reservoir, measured upwards from the bottom of the short leg of the siphon, and e the vertical distance from the bottom of the long leg to that of the short leg, whence it follows that k is a vanishing quantity, which is at zero when the level of the water reaches the bottom of the short leg, and that the carrying power of two siphons of the same calibre and with short legs of a uniform length, but with long legs of different lengths, will vary directly with the lengths of their long legs; also, that the carrying power of any siphon is proportionate to what may be called its efficient length—*i.e.*, the difference between the length of its short and long legs.

There is, of course, no theoretical difficulty in arranging a siphon so that it shall spontaneously empty a reservoir which is filled by either an intermittent or a continuous inflow. The only condition with which it is necessary to comply, is that k (in the formula above) shall always be larger than k', the rate at which the liquid enters the reservoir. It will be seen from the formula that this may be realised in one of two ways; if the long leg of the siphon is not materially longer than the short leg, then the calibre of the long leg must be such as to give a rate of flow when the water in the reservoir is at its lowest level which shall be greater than that of the inflow; and the greater the difference between the two the shorter will be the time that the siphon will take to empty the reservoir; or the same result may be obtained by increasing the efficient length of the siphon. There is, however, generally, great practical inconvenience in doing this, the conditions with which we have to deal being such as to allow the long leg to be but little longer than the short one. In such a case our only course is to increase the calibre of the siphon to such an extent that the rate of flow through it at the time when the water in the reservoir is at its lowest level—*i.e.*, just before the action of the siphon will be spontaneously interrupted—shall always be greater than the rate of inflow into the reservoir. Now here is the point where the difficulty in constructing an automatic siphon begins, for, in order that such a siphon may act invariably, it is necessary practically to make its calibre much larger than that of the inlet to the reservoir. The extent to which it will be necessary to enlarge it will depend upon (1) the ratio between the rate of inflow and the effective length which can be given to the siphon, and (2) to

the time within which it may be required to empty the reservoir, which will be determined by the formula $t = \frac{m}{r - r'}$, where t is the time, m capacity of the reservoir, r the rate of outflow, and r' the rate of inflow. When the reservoir is large, and especially when it is deep, and the efficient length of the siphon is small, it will be necessary to have the siphon of considerable calibre, if the time of emptying it is not to be very protracted. Now, in proportion as we increase the ratio of the calibre of the siphon to that of the inlet, do we also augment the difficulty in making it spontaneously start itself. There is only one form of siphon which will infallibly start itself under all circumstances, and that is a siphon the calibre of which is such that the liquid to be dealt with cannot possibly be introduced into it in any way without entirely filling it. In the case of water, the limit of maximum size of bore is about 5-16ths of an inch. Such a siphon will infallibly start itself, however slowly the water may flow into the reservoir, for directly it reaches the highest point of the siphon, over it goes and the siphon must start. But the very condition which makes such a siphon certain to start, makes it equally difficult to so effectually interrupt its action that it shall cease altogether when the reservoir is exhausted, and not be revived until the level of the water rises to the neck of the siphon again. For the same cohesive attraction which compels the water to entirely fill the tube, also tends to hold more or less of it in the tube when the stage of equilibrium is reached, and unless the size of the tube be carefully adjusted for the purpose, the result will be that instead of having an intermittent outflow we shall have a continuous one, the water in the reservoir always remaining at the same level, if the inflow be continuous, but at a variable one if it vary; that is to say, the siphon will cease to act as a siphon at all. When we once pass beyond the size of tube indicated above, we then enter upon the difficulties connected with starting the siphon. For, in proportion to the ratio between the rate of rise in the reservoir and the calibre of the siphon will be the difficulty of starting it. The slower it rises and the larger the calibre of the siphon, the more certain will the liquid be to merely dribble over the neck of the siphon in a continuous stream without effectually starting it. Mr. Rogers Field seems to think that the difficulty arises from air having a tendency to remain in the long leg, and that he can, to a certain extent, overcome it by the device of sealing the outlet of the long leg by immersing it in a reservoir of the liquid, and also by inserting a shield in the upper aperture of the long leg (which, for this purpose, he separates from the short one, and places within the latter), by which the liquid as it flows into the latter is directed into its centre, and is thus prevented from dribbling down its sides. This device is certainly ingenious, but it is not easy to see how the latter part of the arrangement can act unless the liquid is driven through the aperture in the shield under sufficient pressure to compel it to expand after passing through it into a cloud of drops, which would, unquestionably, more readily entangle the air in the long leg and carry it with it, than a mere film of liquid dribbling down the side of the tube could do. But it is no use supposing that air can be driven out of the tube except by water taking its place. If the rate of flow into the long leg is not sufficient to fill up the whole of its calibre, the siphon cannot start. Mr. Field's device will help a lame dog over the style, but it will not help the dog who cannot walk at all! And it would not be difficult to show that the end which he has in view can be achieved just as well by a different arrangement from that which he has adopted. Mr. Field, of course, sees that the interposition of the shield lessens the carrying power of his siphon to the extent to which it narrows its calibre. The fact is, that the difficulty in question is inherent to the variability of the conditions under which siphons may be called on to act, and unfortunately it limits very greatly the field of their utility. It can never be overcome except by some device which shall store up the accumulated energy of a feeble inflow and convert it into a sudden impulse which shall fill the whole volume of the long leg. Such a device, to work in an entirely automatic manner, is not feasible. The nearest approach which can be made to it is to construct the long leg of the siphon in precisely the opposite way to that adopted by Mr. Rogers Field—viz., instead of narrowing the mouth of the long leg of the siphon, to widen it, and so to increase its collecting power that the smallest possible rise in the level of the liquid in the reservoir shall be sufficient to fill the long leg and thus start it.

Of course this plan would be of no use where the rate of inflow is absolutely uniform, were it not for the fact that the adhesion of liquids to surfaces tends to cause them to heap themselves up somewhat above the actual edge of a vessel before plunging over it. By taking advantage of this fact, and also by protecting the edge of the upper aperture of the long leg with a water-repelling coating, so as to intensify this tendency, it is possible to achieve a certain accumulation of fluid energy and to construct an automatic siphon which will work infallibly up to a certain point. Where the rate of inflow is a variable one, and where the collecting power of the upper aperture of the long leg can be adjusted so as to exceed the average rate of inflow into the reservoir, a very fair approach to an automatic siphon can be made.

THE HYGIENE OF FOOD.

By Ernest Hart.

II.—DINNERS WHICH OUGHT NOT TO BE GIVEN.

In order to attain the standard by which to judge the theory and practice of dinners and dinner giving, it is desirable to approach the subject on the negative as well as the positive side, and it will probably help us to form a more distinct opinion and a more exact practice if we diverge for a moment from the theoretical data of physiology and hygiene, to study practically certain kinds of dinners which are commonly given, and decide whether they correspond to any desirable principles, and whether in practice they are either agreeable or wholesome. First, among dinners which ought not to be given I should be disposed to place a kind of dinner which is most frequently and habitually given as a sort of sacrifice on the shrine of friendship and social exigencies. There is a type of *menu* which is so common that everyone knows it by heart. It is to be found inscribed, perhaps, on at least one half of the daintily decorated cards which are put before the guests at modern parties, and there are probably few who do not take up such *menu* with a distinct shadow of apprehension, that they are once more to be condemned to it. Typically it runs thus: 'Clear' soup, 'thick' soup, turbot, lobster sauce, oyster patty,

sweetbreads larded, roast mutton, currant jelly, pheasants, quails, cabinet pudding, jelly, rice pudding, cheese-straws; with a list of wines, including sherry, hock, sauterne, champagne, claret, liqueurs; and after dinner, sherry, Madeira, claret, and port wine. This is the type so constantly renewed, so venerable, so tedious, so destitute of novelty or attraction, that no ordinarily constituted mind can think of it without a sense of dismay. It is liable to occasional, formal, and unimaginative varieties. The 'thick' soup, so-called (a dreadful name given habitually to a compound hardly less gruesome), is sometimes what is fantastically called mock turtle. In that case, it is apt to consist of a concentrated 'essence of meat', thickened with baked flour and filled with fragments of calf's head; it is more happily designed occasionally as a *purée* of vegetables, and then chiefly of artichokes and described as Palestine soup. These appear to be almost the only two kinds of thick soup known to the average British cook, or pastrycook. The clear soup is, strange to say, usually also a brown fluid, and in itself, therefore, implies a sad misapprehension of the nature of 'clear soup', for clear soup should never be brown, but always, if properly made, of a delicate straw yellow; it is also apt to be filled up with pieces of dried vegetables which have lost all their aroma and delicate juices by a process of desiccation and compression, and have been plumped out again by soaking in water, which has completed the process of making them limp and tasteless, and unsuited to any use except on board ship or long journeys where nothing else can be had than such revivified mummies to represent fresh vegetable.

The course of fish has usually no other offence than its painful monotony, and its heavy and massive character; blocks of a solid fish, such as turbot with the addition of a heavy, rich, glutinous compound, usually chopped lobster in butter. This would be in itself suitable enough for the major part of a meal, but as an introduction to a banquet of many courses is out of place. To the oyster patty there is mainly the objection that it is usually only one out of a long series of dishes, and that while an oyster patty, really well made, is a costly as well as one of the most difficult achievements of skilled cookery, the conventional oyster patty usually presented is an indigestible, pretentious, and costly imitation of that of which it assumes the name. The whole merit of an oyster patty consists in the freshness, tenderness, and pure flavour of the oyster, the delicacy of quality of the slight addition of cream, and the feathery lightness of the paste; in lieu of this the usual presentation is a small leathery edifice filled with tasteless and hardened morsels of oyster cooked at so great a heat as to be shrivelled to the consistence of a boot-sole, and bathed in a kind of book-binder's paste, to which a little milk has been added, and of which the poor flavour has been concealed by being roughly peppered. This is really no exaggeration of the pastrycooks' idea of an oyster patty and of its ordinary form as it appears at many dinner parties.

The 'sweetbread' is considered the inevitable luxury of the course of entrées. It is suitable enough as a hospital comfort, or in convalescence from illness, as the sole dish; but the extraordinary partiality which is at present evinced in our English *menus*, for so singularly tasteless a dish, is only explicable by poverty of imagination. It must greatly surprise foreigners, who can hardly have imagined that so universally prevailing a sentiment existed in this country in favour of the selection of the thymus gland of the calf for the festive dinner table. It can only be supposed that at some time or other some one who had a very sickly digestion to provide for, or a special fancy to gratify, introduced it as a novelty, and having once been seen at English tables, it was seized upon as a British institution and became accepted as a sort of evidence that the particular repast at which it was served was a 'dinner party' and not 'a dinner'. Against the saddle of mutton, as a roast, there would be nothing to be said if it were always well chosen, tender, served hot, on hot plates, and if it formed part of a shorter repast. As a matter of fact, ordinary kitchens are rather heavily taxed by a dinner of this sort, and as the mutton is considered to be something of a rather ordinary character which everybody has been in the habit of having in his own house, much less attention is given to this *pièce de résistance* than to any other part of the dinner; and in consequence the mutton, whether a saddle or haunch, is usually so ill-roasted, so flabby, and has been so long in coming round, in thin slices on half cold plates, handed up and down the table, that it arrives in a state of insipidity, such as would ensure its absolute rejection and a severe lecture to the cook and butler, if it were served in the course of a reasonably short dinner. But allowances have to be made for the delays and fuss incidental to large dinner parties, the coldness and flabbiness of the mutton is but a minor fault which it is not becoming to rebuke. People, therefore, who have perhaps reserved themselves for what they hope will prove to be a cut of wholesome digestible mutton in preference to the 'kickshaws', frequently find themselves sadly disappointed. I leave out the boiled fowl and tongue; it is an insipid, invalid dish, which is beginning to be ostracised for healthy people. The pheasant and game which follow are well in place when they are well-cooked; but they arrive rather late, and, if anywhere, it is here that a certain stinginess is often to be noticed even at liberal tables. If a man entertains half-a-dozen friends, and puts on the table a brace of hot, well-roasted pheasants, he is careful to help the guests only to the choicest parts, and to give them an adequate supply. At dinner parties, however, where it is now the fashion to keep the dishes out of sight, and to hand only rations on plates, it seems to be thought that the ingenuity of the unseen carver may properly be exerted in making a limited supply of game available for a large number of guests, and legs of pheasants, for instance, which are almost to be prohibited, except as a salmi or devil, or in pasties or for soup-stock, are sliced and served in morsels at many a dinner party where the host would be shocked if he recollected that this is not a really kind and hospitable manner of feeding honoured and welcome guests.

The 'cabinet pudding' and the ice pudding are to the epicure a weariness to the flesh and sadness of spirit. The cabinet pudding is a reasonable sweetmeat for an intelligent school-boy or a hungry clerk, but this sort of compound of biscuit crumbs and raisins really belongs to the higher sort of nursery food and should have no place at a banquet. Ice puddings, made at home, are usually good and fairly claim their place. The ice pudding, which is served in many pretentious dinner parties, is mostly 'sent in', and it requires, then, only a blunt perception to quickly become acquainted with the fact that the 'ice pudding' has been mysteriously made with custard powder to do duty for cream, and various cheap chemical essences as substitutes for fresh fruit syrup.

On the whole, then, such dinners ought not to be given, for many reasons. First, because they

involve many more details and a greater number of dishes than any but really skilled cooks can accomplish satisfactorily and with due perfection. Secondly, because, by reason of this excess, quantity habitually takes the place of quality, and instead of its becoming the first duty of the cook and the aim of the host to provide (as an evidence of his hospitable sentiments) only ingredients of the first quality, and materials selected from the best sources, an art has, on the other hand, developed itself of finding cheap substitutes and artificially disguised imitations. The oyster is not the choicest native, as that which any man gives to his friend at a banquet should be; for cream, milk and flour are substituted; for fresh fruit, chemical essences, potted extracts, and so on. These things may properly be used where economy is the first object, and under certain circumstances it is reasonable and right that economy should be the first object; but on an occasion when the sentiments of hospitality prevail, and where the bidden guests are assembled to a feast, however humble, or however restricted, quality, genuineness, careful selection, and careful consideration for to-morrow's digestion should be the guiding principles.

Another objection, reasonably to be urged to this typical dinner-party, is the length to which it is extended. A very exalted personage has, I believe, laid down the rule that banquets, however elaborate, shall be served and completed within an hour; and when the dinner-party is to be followed by music in the drawing-room, or by any sort of subsequent reception, or re-assemblage of the ladies and gentlemen present such a rule might well be followed by those of less exalted station. Then, too, dinners such as these are commonly held to imply a large assemblage of guests, from fifteen to twenty; for it is not worth while taking so much trouble for a few, and here the element of sociality quickly disappears. On the other hand, there is more to be said in favour of a somewhat more protracted allowance of time for dinner-parties now than heretofore, especially where the party is limited in number, and confined to men. Happily, the custom of drinking much wine after dinner is passing away; and it is during dinner that conversation runs its course, and pleasant talk has full flow. The period occupied in dining is not, of course, solely employed in eating and a party assembled at a dinner of males, chatting over the table, may very well spend an hour and a-half in pleasant converse and appreciative discussion.

As to the wines, it is clear that in this *menu* they are too numerous, while they are rarely sufficiently choice. It is in the wines that the generosity, gustatory skill, attention and thought of the host for the pleasure of his guests may most usually be shown, even where the cook is not an accomplished artist; and at a dinner given upon the principles of thoughtful respect for the taste and the digestion of the guests, the dishes may well be few in number, simple in character, choice in quality; while the wines following the same will be confined to not more than three or four varieties, selected from good vintages. Where sherry and port are provided, sauterne and hock are (except in classified *menus* of great banquets, of which I will speak at another time) out of place. On the other hand, where white Burgundy is given, sherry is unneeded and mischievous; it spoils the palate, and unless it be a very light and delicate wine, is too heavy to be suited to the earlier courses of a dinner-party. It can only properly be drunk on such occasions with soup or fish, and then it should either take the place of hock or sauterne. A curious tradition prevails, that what is called ordinary dinner claret may be served at the early part of the dinner, and the choicer qualities of Bordeaux reserved for the end, or after dinner. This is a great error. Immediately after tasting two or three different kinds of wine, the palate becomes almost incapable of distinguishing the finer qualities of any vintage, and claret served at the earlier part of the dinner should be of the finest quality, and at least as good as any which follows. In nothing can the health of the guests be more advisedly consulted than in the exclusion of all wines which are not known to be pure and sufficiently aged. The mixture of wines, in which some hosts invite their guests to indulge, and which so many unskilled, thoughtless, or inexperienced diners do so frequently permit to themselves, is destructive of digestion, and in the end tells upon the most hardened constitution. It used to be the practice at some University wine parties (I am glad to believe the custom is rapidly dying out) to conclude the 'wine' by putting on table a bowl in which punch was made, and pouring in every variety of wine which had been previously served;—sherry, claret, port, maraschino, and whisky were poured into the bowl, and the compound was known as a 'devil'. This rarely failed to upset the sobriety of even the oldest hand, and the name of so diabolical a compound is not ill-devised. This, however, is a sort of mixture which a number of quiet, sober, elderly persons often do not shrink from making in their own gastric cavity; with what results each man's sensations can best tell him next morning.

If, now, we review the *menu* which is so common, and which I have ventured to take as a type of the dinner which ought not to be given, we shall see that its main faults are, first, excess in quantity; second, defect in quality and in cooking; third, indigestibility; fourth, distressing monotony. To bring about a reform, it is first of all necessary to come to an agreement that, as a rule, a dinner party should represent only what can be easily accomplished by a careful use of the actual resources of the establishment. Next, that it should be planned, not according to the conventional pattern of the dinner which A, B, and C gave on the previous week, but according to a careful consideration by the host or hostess, of what are the tastes of her guests, and what are the choicest products of the market within her reach at that time, and what are the powers of her cook. Instead of resorting to the memory of old conventions which have become even to herself a weariness and a sorrow, but which have become stereotyped in her mind as the sort of dinner which everybody gives, the hostess should refresh herself by a review of the choicest and most varied contents of the stores of her purveyors. She should try to think of something which she has not had at the dinners at which she has been present for the previous month, and she should as far as possible eliminate from her mind everything which she has had. She should resort to the best-known guides, to *menus* and selections contained in well-accredited books and almanacks. She should refresh herself by a little study of Brillat Savarin, Hayward, Walker, and the best French and English cookery books; and employ her recollection, and her notes if she has them, of any unusually good dinners which she has had in the course of foreign travels; or she should tax her husband's experience of the best kind of club dinners, and require him always 'to bring home the *menus*'.

The main principle of a dinner of the formal kind, should be first an excellent soup, remembering always that in such a dinner the soup is not to be regarded in itself as an element of nutrition, but as what I have before explained, and spoken of as a 'peptogenic fluid', that is to say, a clear thin juice which would provide the gastric glands with the materials for the abundant secretion of gastric juice by which a more ample and perfect digestion of the whole dinner will be secured. The fish also should be rather provocative of appetite, and a refreshing vehicle of flavour, than in itself a substantial satisfaction to hunger, and the notion should at once be abandoned that there is only one way of cooking fish, and that is by boiling it. Boiled fish is not in itself objectionable, but habitually to adopt that as the sole method of cooking fish betrays the utmost poverty of imagination, and ignorance of the innumerable ways in which fish of every kind lends itself, as a vehicle of flavour, to the enrichment of the *menu*. We have in England the largest and best choice of fish which is to be found in any country in the world, except America, but perhaps there is no other country in which those resources are so imperfectly and unskilfully utilised. The 'sole Normande', the trout sauce bleue, or sauce verte, or St. Germain, the red mullet en papillote, which enter into the ordinary experience of a well-trained cook, should be among the first and simplest suggestions which should occur to the mind in selecting a course of fish. At most of these dinners they would be welcomed as a novelty, unless, indeed, they should come to be seized upon as a part of the conventional dinner, and repeated until they became as wearisome as the boiled salmon and boiled turbot, and fried smelts of to-day. The soup and fish need only be followed by one entrée and by one *pièce de résistance*; which need not by any means always be a roast saddle or haunch of mutton. There are innumerable substitutes, and amongst the most simple is the roasted or braised fillet of beef carved in slices on a long dish, and garnished with tomatoes, mushrooms, or a purée of Brussels sprouts, or any other suitable accompaniment. A fricandeau of veal with a purée of sorrel or spinach is another quite simple but solid dish which is singularly neglected in this country. Then, no such dinner should be complete without its course of choicer vegetables cooked in butter, and salad selected according to season. A fowl or pheasant suitably carved, served on a hot dish, and surrounded with watercresses, or any of the varieties of game should follow. It is a singular prejudice in England which always roasts game. A chartreuse of partridges, or a salmi of game, are often preferable to roasted game, unless the bird be of the youngest and tenderest, and so cooked as not to be dried in the roasting. Game can rarely be properly roasted unless previously enveloped with slices of bacon.

It is not, however, my object to-day to discuss dinners which should be given, but rather to point the moral of dinners which should not be given. There is a form of middle-class dinner which has other objections; it is what is called a family-dinner of solid character, with two kinds of soup, two kinds of fish, roast joint, fowl, or turkey, followed by pheasants and by tarts, puddings, and so forth, and plentifully garnished with large dishes of boiled potatoes and boiled vegetables of all kinds. This is a dinner which has the merit of being usually good in quality, and sometimes excellent in cooking of its kind, but it is more or less a waste of too solid food: it includes the material of three dinners, and would load the stomach of any one, except a thorough John Bull, born to obesity and gout, to an extent which is undesirable. Its main faults are the excess of meat and solid food, the monotonous cooking of all the vegetables in water, the wasteful roasting and drying of all the meats, and the solidity of the accessory dishes. We shall not emancipate ourselves from faults of this kind in construction of dinners until our house-mothers begin to understand more thoroughly their duty of study, and to take more trouble in thinking out their daily *menus*, as well as their future bills of fare. They must also learn to appreciate vegetable foods and fresh fruits more highly. There is a notable tendency to improvement in this respect, but it has yet made but little impression upon the average dinner-table.

THE WINTER CLIMATE OF SOME OF OUR HEALTH RESORTS.

By JOHN W. TRIPE, M.D.,

Secretary to the Meteorological Society and Medical Officer of Health for Hackney, etc.

(*Continued from p.* 216.)

HASTINGS AND ST. LEONARD'S; VENTNOR AND THE UNDERCLIFF, ISLE OF WIGHT; RAMSGATE.

HASTINGS AND ST. LEONARD'S.—Although I have bracketed these together because of their close contiguity, yet it must not be supposed that their climate is identical, as the latter is not so effectually protected by the hills in the rear as Hastings, and is, consequently, more exposed to easterly winds. They must be, however, sufficiently similar as to justify me, in the absence of a series of observations being taken at St. Leonard's, in uniting them at the head of this paper. The observations on which the following table is based were made at Hastings, by Mr. Alexander E. Murray, who kindly supplied me with a copy. The town is protected in the rear by lofty cliffs, which screen it from the northern and north-easterly winds, but it is somewhat exposed to easterly gales. The old town of Hastings nestles among the hills, and is therefore warmer than St. Leonard's, but both may be described as breezy localities. The soil is of wealden clay, inlaid by a good thickness of sand, so that rain quickly dries up. The lower parts of the town are warmer than the vicinity of the house where the observations were made, and are usually selected by those who are suffering from bronchial complaints; whilst, judging from Dr. C. T. Williams' tables, the higher, but not exposed portions of the town should be selected by consumptives, who received more benefit at Hastings and Ventnor than at Torquay, apparently from the more bracing and 'blowy' character of the climate. The chief drawback to Hastings is the limited extent of sheltered ground for taking exercise; but the pier and large room at the end make up, to a certain extent, for this deficiency. The percentage of consumptive patients who were stated to have been 'much improved' at Torquay was 39.0, at Bournemouth 35, at Ventnor 43.4, and at Hastings 44.4, against 55 at Pau, and 58 per cent. at the Riviera towns (Cannes, Nice, etc.), whilst those who returned 'worse' amounted to 41 per cent. from Torquay, 39.6 from Ventnor, and only 29.6 from Hastings, which is almost as low as the Riviera towns.

The mean temperature of Hastings, during the winter months of the years 1874-7, which are those only for which I could obtain satisfactory data, was only 41°.4, against 41°.0 at Camden Town, and therefore, for warmth cannot be compared with any

of the sea-side resorts I have hitherto considered. At the same time, it must not be forgotten that the observations were taken at an elevation of 172 feet above sea level, and conseqnently indicate a lower temperature than exists in the lower parts of the

HASTINGS.
Monthly Means for the Four Winters, 1874-77.

1874-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Means. Hastings.	Means. London.
AIR.							
Mean temperature..	44.4	39.8	41.6	40.1	41.0	41.4	41 0
,, of all highest.	48.8	42.0	45.3	44.0	46.2	45.4	46.4
,, of all lowest..	39.9	36.6	37.9	36.2	35.8	37.3	35.7
,, daily range ..	8.9	6.3	7.4	7 8	10.4	8.1	10.7
Monthly range ..	29.4	26.8	26.9	26.3	29.5	27.8	32.7
RAIN.						Totals	Totals
No. of days.. ..	16	19	19	18	18	90	89
	in.	in.	in.	in.	in.		
Mean monthly fall..	3.90	3.60	4.08	2.24	2.06	15.88	12.39

town. The mean temperature was higher than that of London in November, December, and January, nearly the same in February, and lower in March; but the mean of the lowest was 37.3, against 35.7 in London, the least difference having also attained in March. A comparison between the wind observations also indicate that March is not so suitable a month for a residence at Hastings as in November, and the early winter months. The means of Hastings and Ramsgate are not strictly comparable with those of the other health resorts given in these papers, as the returns were for three years only; but as the difference at Camden Town, between the means for the three and four years respectively, did not in any month exceed 1°, and in one month, January, was only 0.2 of a degree below the average, the variation cannot be large. The mean at Guernsey was 45.0°, at Ventnor 44.4°, at Llandudno 43.5°, at Hastings (after corrections for the missing year) 41.8°, and at Ramsgate 41.5°. The mean of all the highest observations was 45.4°, against 46.4° for Camden Town. The mean daily range of temperature at Hastings having been only 8.1°, against 7.9° Guernsey, 8.0° at Ventnor, 8.8° at Torquay, and 10.7° at Camden Town. It is, therefore, clear that the vicinity of the sea considerably modifies the climate, although it does not deprive it of its invigorating character in winter. The average number of rainy days was about the same as in London, but the total rainfall was greater, having been, on an average, 15.88 inches against 12.39 in London. As one of the years was unusually rainy, this shows that the average rainfall at Hastings is less than at any of the other sea-side stations during the winter months. The lower temperature and less rainfall indicate a greatly decreased influence of the gulf stream, as compared with the other localities. Mr. Vivian, in his *Climate of Torquay*, gives a difference in the mean winter temperature of the two places at 5°, which is somewhat in excess of these observations, and is probably considerably greater than the truth, if the most sheltered part of Hastings be compared with the sheltered parts of Torquay. The other differences in the climate show that invalids, likely to receive benefit at Hastings, would find Torquay far too relaxing, and *vice versâ*. Dyspeptics, as well as consumptives, and others suffering from low vitality, would find this climate suitable for them in the late autumnal and early winter months.

RAMSGATE.—It is only of late years that this town has attracted any special notice as a place of winter resort for invalids, although its sheltered position and the meteorological observations taken there indicate that it possesses a somewhat similar climate to that of Hastings, which has for so long a period been much frequented in winter. There is but little doubt that this has arisen to a great extent from the supineness of the Town Council, who have omitted to provide any of the requirements necessary for the comfort of visitors in cold weather. Until lately, there has not been any sheltered walk near the sea, or any large room where visitors could meet or rest and at the same time be protected from the wind and rain; no concert or music-hall on the pier as at Hastings and elsewhere, nor any suitable amusements, except in summer. But the public spirit of Mr. Edmund F. Davis has done something towards removing some of these objections by constructing a Marina with a hall at one end; yet even now the space for taking walking exercise sheltered from the land winds is very limited. The marina and houses facing the harbour are placed immediately under the cliff, and the sands are also very near the cliffs, so that persons walking in either of these situations are fairly protected from land breezes, and breathe an air containing much saline matter. The upper cliffs are 'blowy' places, but when the wind comes from the sea afford sufficiently large and pleasant exercise ground, except when the wind is too boisterous. The air is bracing and usually soft, and not keen like that of Margate. The cliffs are of chalk, so that the rain quickly soaks in or runs, consequently the atmosphere is drier than at clayey places. The mean humidity for these months (saturation being 100) was 86, which is drier than London.

RAMSGATE.
Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Means. Ramsgate.	Means. London.
AIR.							
Mean temperature..	44.0	39.7	41.0	39.7	41.8	41.2	41.0
,, of all highest.	48 9	43.6	46.1	43.8	47.7	46.0	46.4
,, of all lowest..	39.1	35.7	35.9	35.5	35.9	36.4	35.9
,, daily range ..	9.8	7.9	10.2	8.3	11.8	9.6	10.7
Monthly range ..	32.3	32.3	32.6	30.7	28.9	31.4	32.7
RAIN.						Total.	Total.
No. of days.. ..	13	16	17	17	14	77	89
	in.	in.	in.	in.	in.	in.	in.
Total fall	3.82	3.12	3.12	2.19	2.11	14.36	12.39

The great similarity between the climate of Hastings and Ramsgate, at the two stations where the observations are taken, is very noticeable, the monthly mean temperature at Hastings and Ramsgate being respectively 41.4° and 41.2°; the mean of all the highest 45.4° and 46.0°; the mean of all the lowest 37.3° and 36.4°; the mean daily range 8.1° and 9.6°, and the mean monthly range 27.8° and 31.4°. The mean daily temperature was calculated from the means of the daily highest and lowest observations, which is more correct for sea-side places than the using corrections. The chief difference arises from the lowest temperatures at Hastings being above those of Ramsgate to the extent of nearly 1° a day. As compared with London, the chief excess of temperature occurs in November and December, and the least in March, showing that this is the least suitable month as a winter residence. The number of rainy days at Ramsgate and the total rainfall were less than at Hastings, the mean of the three years having been 77 rainy days at Ramsgate to 90 at Hastings and 14.36 inches of rain at Ramsgate against 15.88 inches at Hastings. The meteorological differences between the climate of Camden Town and

that of Ramsgate and Hastings do not show the whole, or anything near the whole, of the change which visitors to those places experience by removal from London, as the greater amount of sunshine, the more stimulating character of the air, owing to more ozone, and oxygen, as well as the presence of saline particles in the air, and the sheltered position of the houses from land breezes, have all to be taken into account. The air of these two health resorts, even when all the influences just mentioned have been taken into account, is not likely to suit those to whom the more sedative atmosphere and more even climate of Scilly, Penzance, Guernsey, and the lower parts of Torquay, are peculiarly notable. On the other hand, those who require a bracing climate and can take walking exercise, will find both suitable, Ramsgate being somewhat colder and more bracing than Hastings. Much, however, has yet to be done at Ramsgate to render it a formidable competitor to Hastings, where better provision is made for the amusement of those visitors whose ailments are not sufficiently severe to prevent them from joining in outdoor recreation. The number of houses, also, at Ramsgate protected from land winds, except those in the town and away from the sea, is but small as compared with those at Hastings and St. Leonards. For information as to the sanitary statistics of Ramsgate, see SANITARY RECORD, vol. 2, p. 426, and as to its water-supply, which is described as being without fault except for its hardness, in the SANITARY RECORD for September 7th, 1877.

VENTNOR AND THE UNDERCLIFF, ISLE OF WIGHT.—The Undercliff is a landscape extending for about six miles at the back of the Isle of Wight, varying from a quarter to half a mile in width; is sheltered by the cliff and, in some places, by lofty hills from northerly, north-easterly, and north-westerly winds, as well as from the westerly. It is raised from fifty to sixty feet above the sea, having access to the beach either by steep cliffs or a sloping surface. The Undercliff is chiefly composed of limestone rocks, forming terraces, resting on blue marl, whilst the downs, which are situated on the top of the sheltering cliff, are constructed of chalk and sandstone. The soil, therefore, is of such a nature as to give immediate passage to the rain which falls upon it, and renders the air unusually dry and invigorating. The air is peculiarly suitable for the consumptive, as the climate is not relaxing, although mild and equable. It is also recommended as a winter residence for those who are suffering from chronic bronchitis, laryngeal affections, and other maladies, such as scrofula, general debility, etc., which require a somewhat bracing atmosphere. The chief place of the Undercliff is Ventnor, which is situated at the base of St. Boniface, a hill rising 700 or 800 feet above the town and effectually shielding it from the north and east, and the houses, partly built on its lower slopes, extend down to the water's edge. There is a good pier recently erected, fine roads, and plenty of vehicles of all kinds, and as the rain speedily dries up, invalids can take walking exercise at almost all times. As to its suitability for a winter residence, Sir James Clark was almost enthusiastic, as he says, after leaving the downs and entering the Undercliff, 'You feel at once you have entered a new climate, and the luxuriance of the vegetable tribes which you find around you, proves that the impression made on the senses has not been deceitful'. The table given was compiled from observations forwarded to me by Mr. Aldridge, taken at Ventnor, I believe under the superintendence of or by Mr. Martin.

The mean temperature for these months was 3.5° below that of St. Mary's, Scilly, and 1.4° below that of Penzance. The mean of all the highest was

VENTNOR.

Monthly Means for the Four Winters, 1873-77.

1873-77.	Nov.	Dec.	Jan.	Feb.	Mar.	Mean.
AIR.	°	°	°	°	°	°
Mean temperature	47.7	42.7	44.8	42.8	44.0	44.4
,, of all the highest ..	52.1	46.1	47.8	46.7	49.0	48.3
,, of all the lowest ..	43.4	39.4	40.8	39.0	39.1	40.3
,, daily range	8.7	6.7	7.0	7.7	9.9	8.0
Monthly range	28.7	25.2	21.5	23.0	27.7	25.2
RAIN.						Total.
No. of days	17	16	19	16	11	79
Mean monthly fall ..	in. 3.89	in. 3.01	in. 3.84	in. 2.41	in. 1.87	in. 15.02

2.2° below that of Scilly, but only 0.3° below that of Penzance, which, considering the difference in longitude and greatly diminished effect of the Gulf Stream at Ventnor, is singularly small. The mean of all the lowest is, however, rather considerably below that of Scilly and of Penzance, as it was 44.5° at the former and 42.6° at the latter, against 40.3° at Ventnor, so that the night air at Ventnor is decidedly colder than at either of these, and also, to a smaller extent, on the south coast of Devonshire and Cornwall. The mean of all the lowest readings for these months were as follows:—At Torquay 41.9°, at Ilfracombe 41.7°, at Guernsey 41.3°, and at Ventnor, as just stated, 40.3°, and in London 35.9°. The mean daily range at Ventnor is greater than at Scilly and Penzance, being 8° against 6° at these localities, but it is nearly the same as at Guernsey and Hastings, where it was 7.9° and 8.1° respectively. The mean monthly range showing the extreme variation of temperature in each month was greater than at Scilly, Penzance, and Guernsey, as might have been expected from the greater influence of the Gulf Stream at these localities, but it was nearly the same as at Torquay—viz., 25.2° against 32.9 °in London. The mean number of rainy days for each winter season and the total rainfall was less in Ventnor than at Scilly, Torquay, Penzance, Guernsey, and Ilfracombe, but much greater than in London. Considering the short distance of Ventnor from London, the mean temperature varied largely, being at Ventnor, in the months of November, December, January, February, and March, 47.7°, 42.7°, 44.8°, 42.8° and 44.0° respectively, against 43.4°, 39.6°, 41.5, 39.8°, and 42.3°, in London. The town is also decidedly warmer than Llandudno, Hastings, and Ramsgate. The thermometrical observations taken at Ventnor are very similar to those recorded at Guernsey, as the mean winter temperature is only 0.6° below, the mean of all the highest only 0.8° below, and the mean of all the lowest 0.9° less, whilst the daily range is only 0.1° greater than that of Guernsey. It is, on the whole, evident that whilst the climate of Ventnor is not so warm as that of the Scilly Isles, of the coast of Cornwall and Devonshire, as well as of the Channel Islands; that it is more bracing than either, and that from its protected position and porous soil it is more suitable for persons suffering from consumption and diseases of debility than health resorts on the Cornish coast, Scilly, or Guernsey.

The Bolton Town Council have issued regulations under the Dairies, Cowsheds and Milkshops Order of 1879 for the construction, water-supply, and sanitary state of dairies and cowsheds within their district.

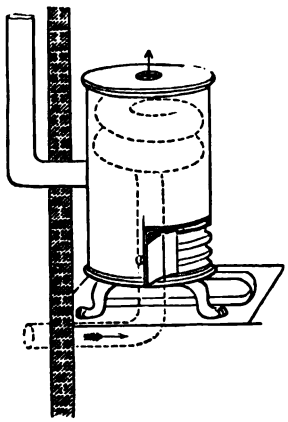
A DICTIONARY OF SANITARY APPLIANCES.

By W. Eassie, C.E.

(*Continued from p.* 281.)

AIR.—XXX.

Delivery of Warmed Air from Without (*continued*).—To stoves of this description, which effect all the purposes of the Galton and other succeeding grates, it has been common of late to apply the name calorigen, or calorifère, the former word being of English and the latter of French origin. The best examples, and indeed the only ones much in use are the calorigens invented by Mr. Richard George, whose earliest experiments I witnessed with great interest. In 1867 Mr. George introduced the calorigen in which coal was used, and which I will now proceed to describe.

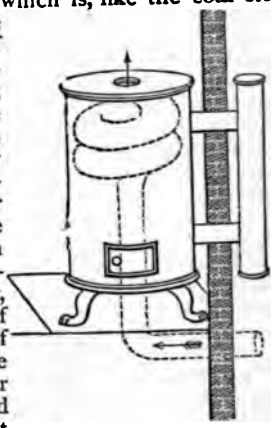


George's Coal-burning Calorigen.

The coal calorigen consists of a chamber of thin sheet iron, the proportions of such chamber being large relatively to the dimensions of the fire-place or grate in which the fuel is burnt, in order that the products of combustion may circulate within such chamber some time before passing into the chimney or flue. The grate or fire-place is arranged near the bottom of the chamber, which is supported upon legs, and the stove or fire-place is so arranged that fuel can be readily supplied to the grate, under which a pan is placed to receive the ashes. The products of combustion from the fire-box or grate, after circulating within the chamber, together with the impure air drawn from the apartment, pass away through a pipe or flue at the back of the chamber of the stove, such outlet pipe being provided with a damper. A coil of pipe is arranged within the interior of the chamber above the grate or fire-box—the lower end of this pipe passing out through the lower part of the case—and it is so arranged as to be in communication with the atmosphere exterior to the room or building to be heated. The upper end of this coil of pipe passes out at the top or upper part of the outer case of the stove, where it is in open communication with the interior of the room or building. The heat from the fire-grate portion of the stove is transmitted through the surface of the coil of pipe, and causes a current of air to circulate through the pipe from the exterior of the room into the interior, and this current of air has sufficient heat imparted to it without injury to its respiratory qualities by contact with the surface of the pipe, the thinness of the metal of which the pipe is formed causing it to transmit the heat rapidly without itself attaining a high temperature. A deposit of carbon is also formed upon the exterior of the pipe and upon the inner surface of the chamber, which assists in preventing the inlet pipe and the chamber from becoming overheated.

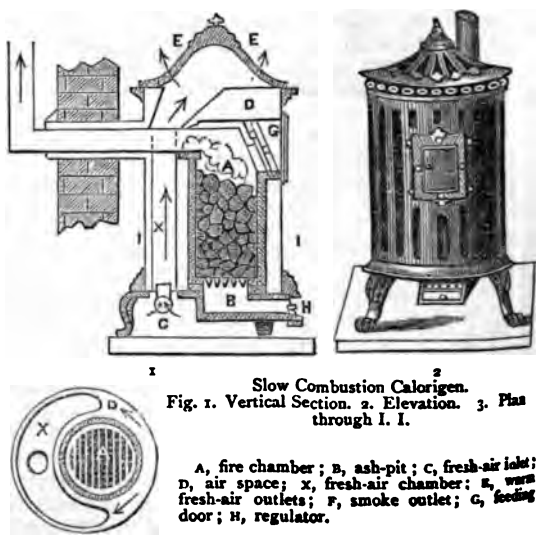
The success of the coal calorigen was so pronounced for use in rooms adapted for them, that in the year following, Mr. George gave his attention to the matter of gas stoves, and succeeded in producing what is called the gas calorigen.

In this contrivance, which is, like the coal stove, perfectly portable, the outer case is formed of thin sheet iron or copper, supported on legs; and a gas-burner of the ordinary ring form is fitted inside. The air for supporting combustion enters the chamber of the stove by the lower inlet pipe from the flue in communication with the chimney, and the products of combustion pass out of the chamber into the flue by the upper or outlet pipe—an upward and downward current being thus established in the flue. There is also a door furnished with a panel of glass or mica, which is closed when the gas is burning, so as to exclude the passage of air through the opening of the door. There is also a diaphragm, for distributing the air for supporting combustion, and another diaphragm for causing the heated products to circulate with the chamber of the stove. It will thus be seen that the heat from the heated products of combustion of gas burning within a chamber of metal, is transmitted through and radiated from the sides of the chamber—a current of air passing at the same time from the exterior to the interior of the apartment—through a pipe of thin iron, arranged in such a manner within the chamber of the stove as to warm the air passing through it.



George's Gas-burning Calorigen.

In 1879, Messrs. Farwig of London, who manufacture these Calorigens, introduced a slow combustion Calorigen, which is much approved in fever wards of hospitals, and for use at board schools. It is also well adapted for use in halls and vestibules where there is a changing atmosphere.



1 2

Slow Combustion Calorigen.
Fig. 1. Vertical Section. 2. Elevation. 3. Plan through I. I.

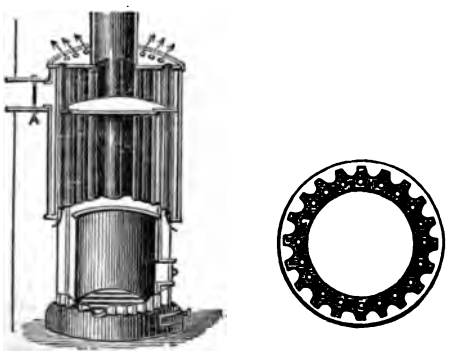
3.

A, fire chamber; B, ash-pit; C, fresh-air inlet; D, air space; X, fresh-air chamber; E, warm fresh-air outlets; F, smoke outlet; G, feeding door; H, regulator.

This stove, like others, is lighted in the usual manner upon a foundation of paper, small pieces of wood, and small coke; the ash door being removed to create a draught. When the coke is well alight, the stove is filled up with small coke and the ash door replaced. There is also a sliding or dropping valve introduced above the ash door so as to regulate the draught necessary for combustion.

As in the case of the coal and gas calorigens, these slow combustion Calorigens are fitted up with a pipe, one end of which is in communication with the external atmosphere, and the other extremity terminating in the crescent-shaped warmed fresh air chamber, the outlets of which are pierced in the surmounting of the stove. There is no escape of fumes when feeding, and at a cost of less than fourpence, the stove will burn, if properly alight and charged, without attention, for about twelve hours. It is therefore admirably adapted for keeping up a circulation of warm air in an inner hall or staircase during the night.

Delivery of warmed Air, the Air being taken from the Room.—In the foregoing contrivances for the delivery of warmed air into a room, the air is brought direct from the external atmosphere, and the burning of such air is sought to be prevented by a regulation of the time in which it is delayed in the coil in the interior of the stove chamber; but there are also stoves which prefer to heat the air in the room, and of this order is that invented by Messrs. Truswell and Holden, of Sheffield, in 1874, and, with some modifications of the original design, now manufactured by them, and sold as the school or hot air stove. The stove is, however, so arranged, in conception, that it can be supplied with air from without, if necessary, and deliver it in a warm condition into the room.



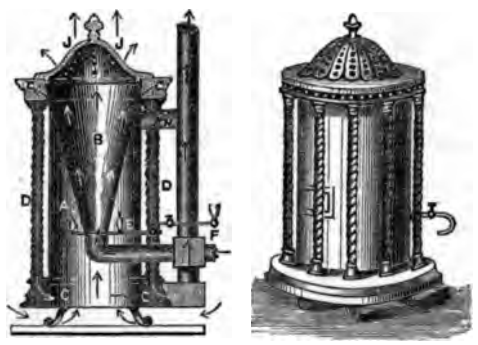
1. 2.

Truswell and Holden's School Stove, for supply of warm air. Fig. 1. Vertical Section. Fig. 2. Plan of upper portion.

In one pattern of this stove, the fire-box is below the warm air delivery portion, and the air to be warmed enters the circular caliducts in the jacketing of the upper portion of the stove, and being heated in its passage through them, is delivered into the room at the crown of the stove. The heating or radiating power is moreover increased by the hollow or corrugated gills which form the circumference of the stove.

As an example of a well-known, fresh warmed air delivery stove, which is preferably made to use the air in the room, to air from without, for the supply necessary to secure combustion, the Euthermic Ventilating Stove, designed by Dr. F. T. Bond of Gloucester, must be taken as a type. The stove consists of an iron cylinder, inside of which is fixed a hollow cone, the upper and broader margin of which is attached in an air-tight manner to the upper margin of the cylinder, whilst its lower and smaller aperture is connected by a tube with the outer air. Around the cylinder a series of tubes, in the form of columns, are fixed, the upper ends of which communicate with the space between the cylinder and the cone, and the lower ends open into an annular chamber which surrounds the base of the cylinder. From this chamber an outlet flue proceeds, which is also connected by a branch, near the top of the stove, with the upper portion of the space between the cone and cylinder. In this upper branch tube is a throttle valve, by means of which the way through it can be closed. Inside the cylinder and surrounding the lower part of the cone is a ring of burners, which is supplied by a pipe carried through the cylinder from the outside.

When the ring of burners is lighted, the air necessary to support combustion is supplied through the opening at the base of the cylinder. The heated air and products of combustion then pass upwards to the junction between the upper margins of the cone and cylinder, when, if the way through the upper branch flue is open, they will pass directly into the flue; but, if it be closed, they are compelled to pass down through the series of branch tubes into the annular chamber and so into the flue. This latter may be carried directly into the outer air, or, which is a preferable arrangement, into an unused chimney flue, closed at the bottom to prevent reflux into the room.



1. 2.

Dr. F. T. Bond's Euthermic Ventilating Stove. Fig. 1. Vertical Section; Fig. 2. Elevation. A, cylinder; B, hollow cone; C, annular chamber; D, series of tubes; E, ring of burners; F, gas jet and independent tap, for lighting the burners inside the cylinder; H, throttle valve, and alternative flue; J, exit for warmed air, brought from without.

Dr. Bond's object in preferring to supply his stove with air direct from the room is twofold. In the first place such an arrangement secures a certain amount of circulation of air through the room—the fresh air coming through the cone being heated there, then rising into the room, and ultimately passing into the stove to support combustion; whereas, if the burning chamber of the stove were supplied with air direct from without, no such circulation would take place; and, if no outlet were provided in any other way, the cone, and inlet attached to it, would be useless. His second reason is, that he objects to box up a gas stove, because it is then open to the risk of serious explosions. In Dr. Bond's stove, if such an explosion were to occur, which could only happen, in any case, through sheer negligence, its force would be so dissipated through the hole at the base, that no damage could result.

Dr. Bond has made several alterations in this stove since its first introduction. The drawing which I have engraved illustrates a stove in which the supply of fresh air for the cone is brought in through

hich carries the gaseous products of om the fire-place to the chimney is wo or more flue-tubes, which are sur-

between (7) and (6), the upper end of the soil-
The water-closet ought to be of the simplest po
construction, and the small ventilating air-pi

should in this case be placed as shown in the drawing, above W.C. water-trap.

The whole cost of the materials for this system of disconnection does not amount to £1, while the consumption of water required for flushing, etc., is not great. I desire to say that my only object in bringing this plan of disconnection forward so prominently, is to invite the criticism of other experienced sanitarians.

Before concluding the necessarily brief remarks, I may call attention to an ingenious device of Mr. Hall's for trapping the cellar grid, as shown in (fig. 5). It consists of a circular disc, from the centre of which projects downwards a heavy iron rod, and to the lower surface of the disc is fixed an India-rubber ring, which, from the weight of the disc and rod, so presses on the pointed edge of the flange which surrounds the opening of the shaft, that the ingress of all noxious gases is prevented.

THE

SANITARY RECORD.

FEBRUARY 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

THE CONSUMPTION OF DISEASED MEAT.

THE Metropolitan Board of Works has enhanced its credit in no small degree by its earnest debate upon the present subject, which was forced upon it, somewhat irregularly it seems, by Dr. Brewer, who took the occasion of a sum of £708 7s. 3d. being demanded for compensation for fifty-three animals slaughtered in consequence of being affected with pleuro-pneumonia, to challenge the way in which the Act of 1878 (41 and 42 of the Queen, ch. 74) was carried out by the Board. Dr. Brewer maintained that the words of the Act implied one thing, and that the action of the Board (perhaps unavoidably, as advised at present) was another thing altogether. The words of the 21st section of the Act direct that the local Authority shall cause all cattle affected with pleuro-pneumonia to be slaughtered within two days after the existence of the disease is known to them. If the owner neglect to give the earliest notice of the existence of disease in any beast under his charge, the local Authority can refuse any compensation, and the owner is liable to an additional penalty for concealment. Dr. Brewer observed, that in the cases brought before the Committee, it was only in the last stage of disease, when the lung mischief was extensive, and the powers of life exhausted, that the notice of the Peripneumony, which terminated the febrile stage of the contagious and infectious epizootic, was given. The pleuro-pneumonia is an enzootic, or native disease, in Asia, Africa, and of late years well nigh a permanent intruder in Central Europe. In Germany it is called *Lungen-seuche*, and has an incubative stage, or a premonitory fever of from 30 to 40 days. This is the stage in which infection is to be most apprehended, and this is the stage which can be, and is, by shrewd observers of disease in cattle, detected by watching the temperature of the animal and the pulse. It appeared, Dr. Brewer said, that the intention of the Act was that the disease itself, and not its mere terminal stage, should be the subject of instant notice to the Authorities. If this were not so, it was obvious that a door was open to fraud in the sale, purchase, and compensation, which would not only defeat the object of the Act, but inflict a grievous injustice on the ratepayers. Dr. Brewer alluded to one typical case, which had come before the Committee for compensation, that of a Dutch cow, purchased in the market three days before calving, and which was slaughtered a few days after, in a very advanced stage of pleuro-pneumonia. It was beyond question, that this animal was in a state of disease many days before it was purchased; and the Act, although it excludes these cases from any title to compensation, beyond that of the value of the carcase, does not shield the country from the consequence of this fraud in a less flagrant degree, if it be carried out in the spirit of the Orders of Council, and not strictly in the letter of the Act.

But the second head of Dr. Brewer's protest is of a still more serious nature. It appears that milch cows, in this epizootic fever, do not cease to yield milk, nor is the milk even seriously decreased in quantity till the last stage sets in; but, nevertheless, emaciation of an unusual character is observed. In very many cases, milch cows are killed in the disease whose condition is described as a 'bag of bones', and in some of the cases the salvage of the whole carcase realizes a 'shilling'. In the majority of cases, however, the carcases of diseased cattle slaughtered by order realise one-half the compensation. There is this remark in a Report to the House of Commons in 1863:—'It is computed that in the 12,000 cows kept in London, a sum annually is lost of £80,000. But as diseased flesh is sold for food, there is a much larger salvage than would be saved if inspection were more rigid.' Dr. Brewer said that disease from the feeding of children with the milk of cows in an advanced febrile state, had been traced with some degree of certainty; thrush, colic, and skin sores were strongly suspected to arise from this source. But the sale of meat from an animal slaughtered in the last stage of disease was denounced as most objectionable; and this, whether destined for human food, or for the food of animals, which all form part of the supply of our meat markets. The diseases of pigs fed on diseased animal food have been communicated to human beings, and terminated fatally; and that this practice is not confined to Germany, but has been common to Great Britain, is beyond controversy. Let us take the returns to the House of Commons of 1862, of the 490 cows killed in disease in 44 dairies; of these 394 were sold to

the butcher; and 96, in a worse condition, sold for pig's meat. Of another batch of 584 killed, 397 were sold for butchers' stalls, and 187 for pigs. Out of 1839 cows killed, 791 are sold for butcher's meat, and 283 for pig's food. It is beyond doubt that in England, as well as in Germany, pigs fed on diseased animal food are, and have been, liable to very severe diseases, which in turn are communicated to those who eat their flesh; nor is the mischief confined to those parts which, to the naked eye, are obviously affected; but it extends to every part of the carcase. The hams sold raw have, to the naked eye, nothing remarkable. They are salted, and some even smoked, and yet the diseased matter remains. The long subjection of the carcase to great heat seems to neutralise the poison, but it does not render the meat wholesome, or strictly innocuous; in many cases, the cooked joint has proved itself hurtful, and, as we have lately seen, fatal, in the case of the youth who died on the training ship *Cornwall*. (See SANITARY RECORD for Jan. 15th, page 263.) Is, then, the food which proves so dangerous to pigs, of value as nutriment to man—to the human subject? We think that the conclusion which was pretty generally arrived at by the Metropolitan Board is absolutely incontrovertible. Mr. Ingleby maintained that the community should be protected by that Board from a source of disease, so obviously dangerous, as that which the sale of carcases of infected beasts provoked. He doubted if the poor could sufficiently rely on the immunity which thorough cooking could afford. Mr. Freeman concluded that, to say the least, the eating of diseased meat reduced the quality of the blood and vital energy, and the disorders which arose from this degeneracy shattered the nervous system, and deprived of health and life many persons of low vitality. Mr. Selway said, he thought it a most unfortunate thing for the Board to derive any revenue from the sale of diseased meat; and Mr. Runtz wound up by saying that it seemed to him wrong, that when animals were not fit to live, they should be thought fit to eat when dead.

Mr. Richardson hardly realised the gravity of the question, when he put off the whole responsibility from the shoulders of the Board, and placed it on those of their veterinary officers. If such a protection be adequate, whence the experience of the last twenty years that diseased animals from abroad are landed, and have been over and over again distributed, and carry disease, which is allowed to remain undetected, and infects hundreds and thousands of sound animals. And Mr. Jones's statement that pigs have often diseased livers, and that small-pox and other diseases have an incubative stage of fever, and that men must run the risk, unless all liberty is to be stopped, is not an excuse for selling meat which is taken from a beast in the last stage of disease, and that with the knowledge of the person selling it.

Dr. Brewer stated rightly, that the well-known cadaveric venom, which often proves so fatal to young medical men, is known to be the result of disease to which the individual under examination succumbed. This venom was believed to be greatly mitigated by decomposition of the body, or by its exposure to a very high temperature, and a similar venom was not unlikely to be found in any animal after a long and severe attack of fatal types of fever. Emaciation characterises a large proportion of the beasts slaughtered in pleuro-pneumonia, indicating the presence of some generally diseased condition, and the very terms of this undeniable statement, indicate the unfitness of the flesh of the animal for human food.

That the Privy Council and the Local Authorities are not justified in selling the carcases of beasts slain during pleuro-pneumonia, for human consumption, or for the food of animals which are destined to be eaten by man, is an indisputable *lemma*. It is a conclusion at which the Legislature arrived when it punished the adulteration of food by exposure and penalties.

To say that the disease which wastes the body and ultimately destroys life, is confined to the 'lungs', towards which it determines, and in which it terminates, is to ignore the whole rationale of the building up and destruction of the system of organised beings. Health, at any price, is a public economy; and disease, under any consideration, is true national poverty.

THE POLLUTION OF WATER-COURSES.

THE correspondence between Major Lamorock Flower and Mr. Bailey Denton, which appeared in our last issue, suggests to sanitary minds some points of great interest. It may be remembered that the latter gentleman read a paper at the Sanitary Congress held at Croydon in October last, 'on certain points in the work of the engineer which have a direct bearing on public health', in which he stated that the water of the river Lee still continued to be polluted with the sewage of various villages, of greater or less size, lying to the north and west of Hertford, and that as he himself lived within the water-shed of the Lee in a village containing 2,500 persons, he could state positively that at the time he was speaking the sewage from that place was running into a branch of one of the tributaries specified in the Lee Conservancy Act, and by that means reached the main river. He assumed that as this fact was brought under the notice of the Lee Conservancy Board some years back, and they had taken no action in the matter that they considered they had no jurisdiction.

These remarks, it seems, attracted the attention of Major Flower, the Sanitary Engineer of the Board, who, it appears from the correspondence, thereupon enclosed to the author of the paper copies of certain notices clearly indicating that the Conservators had jurisdiction over every stream and watercourse within the water-shed of the Lee, and that Major Flower himself had 'every ditch under his charge'.

We observe that though the Major emphatically claims for the Board and himself this wide control, he does not deny that the watercourse referred to was legally within it, or that the sewage of the village, little or much, was discharged into that watercourse, nor does he deny that there are many other villages which do the like. In the special case referred to, the village was Stevenage, which is under the control of a responsible authority in the shape of a local board, and which has been in existence five years, during which time the Conservators have allowed the same state of things to exist without any effort on their part to bring that authority to its senses.

It wants no engineer to decide the question whether Stevenage really does discharge its dirty liquid into that branch of the Beane which passes through Watton to Hertford. A glance at the ordnance map clearly shows that such must be the case, and that the sewage of Stevenage, having arrived at Hertford, mixed with the water of the Beane, is further diluted by the Mirom and the Lee proper before the united waters become serviceable for the supply of London through the channels and pipes of the New River and East London Waterworks Companies. This is undeniable. To realise this truth at the present moment is opportune, for we shall have two bills before Parliament in the present Session, upon which the facts to be elicited from the discussion may have a bearing. It is officially announced that Mr. Secretary Cross has determined to buy up the water companies with a view to place the supply of the Metropolis under the control of a central authority free from those interests which influence commercial bodies, and we may fairly ask, will that central authority accept the water supplied to London by the New River and East London Waterworks Companies in the polluted condition in which the River Lee Conservators have allowed it to remain?

The question is the more pertinent because we are also informed that the Government intend to reintroduce the Rivers Conservancy Bill of last Session, with a positive intention of carrying it if a general election does not intervene. The Bill of last Session excluded from its powers the Conservancy of the Lee as well as that of the Thames, and, therefore, there is no hope of any alteration in the character of the Board now presiding over the Lee and the streams and watercourses flowing into it, unless the discovery of the facts now brought forward should lead to some change in the views of the Government. To make the facts clear, we would point out that any urban or rural authority within the watershed, allowing sewage to flow into the Lee and its tributaries, is liable to a penalty of £100, with £50 a day after conviction. It is, therefore, certain that the Conservators must have considered the sewage of 2,500 people discharged into an upper branch of the river harmless, or they would not have been content to allow five years to pass without exerting their powers, after having had their attention drawn to the circumstance.

Upon this assumption we emphatically ask how it is possible that a village, containing more inhabitants than some market towns in the Kingdom, can exist on the banks of a tributary of a river serving the important purpose of the Lee in relation to the water-supply of the Metropolis, without injuriously affecting the potable condition of the water of that river? If the possibility really exists, the sooner it is recognised by Parliament and the judges in our law courts the better, for an immense amount of litigation would be saved, and much anxious apprehension appeased.

By the Rivers Conservancy Bill of last Session, it was intended to give power to future conservancy boards to take proceedings to enforce within their district the provisions of the Rivers Pollution Prevention Act 1876, and for that purpose they were to be constituted Sanitary Authorities within the meaning of that Act. When considering this provision, upon the reintroduction of the Bill this Session, it would be well to understand whether the sanitary duties of a conservancy board are to be measured by the proceedings of conservancy boards already in existence, and which, having been recently constituted, may be supposed to be acting upon the best recognised principles. If so, and it is hardly possible to avoid precedents, how are we to regard the case disclosed by the correspondence to which we have drawn attention? For our own part, we do not hesitate to declare that in a watershed district threaded by rivulets, watercourses, and ditches, receiving the liquid filth from numerous small populations and single establishments, it is quite as necessary to preserve from pollution such minor tributaries as it is to exercise vigilance with regard to the outflow from our larger cities and towns.

At the present moment the fact is lost sight of that in small streams a small quantity of sewage pollutes them quite as much as larger quantities of contaminating matter injuriously affect a main river, and the aggregation of numerous tributaries, bringing down the sewage of numerous villages and farmyards, may contain matter as injurious to the inhabitants using the water below as the outflow of one town discharging a quantity of putrescible matter equal in amount. This disregard of pollution in detail is in a great measure due to the inclination of the Local Government Board to spare the poorer populations of villages and the occupiers of single dwellings and farms; but we hope it will not be long before a very different view is taken, for it is the very reverse of economy to allow either rural or urban authorities to evade their duties by the execution of inferior works which in a very few years must give way to more substantial measures.

Dr. Anningson, medical officer of Health for Cambridge, at a recent meeting of the sanitary authority reported that there were 168 deaths registered in the town during the quarter ending December 31, being 45 fewer than were registered in the corresponding quarter of 1878. The death-rate for the quarter was 19.6 per 1,000 per annum. The birth-rate was 28.3.

NOTES OF THE MONTH.

BEEF AND BREAD.

The true basis of alimentation, says a good contemporary authority, is not beef, but wheat; and in a natural and rational system of dietetics, wheat and the allied seed foods, including beans, lentils, peas, and rice, must take the place now usurped by the allied animal foods, including butter, cheese, eggs and milk. Next to these should come the appetising juicy fruits, and then the plant foods, which are neither seeds nor fruits, and which are generally styled vegetables. After these the various animal foods, and last of all the stimulating spices, beverages, and other food adjuncts, which unfortunately rank so high in our present ill-advised and ill-proportioned dietary. The fowl or the joint occupies the post of honour, while the loaf is thrust to one side and too often forgotten, or overwhelmed in the crowd of seasoned dishes, or supplanted by cakes and pastries, from which the glorious vitality of the wheat has been successfully extracted. In fact, the miller and the baker between them have so contrived to emasculate the king of grains that we need not wonder that bread has been dethroned by beef, and even among the poor, by demoralised, ignoble pork and beer. The true life-giving, mental, moral, and physical force-producing bread is neither more nor less than sound, ripe wheat when deprived of its thin outer silicious, innutritious husk, coarsely ground and mixed simply with water, and subjected to just that degree of kneading and baking that will suffice to prepare it for mastication, insalivation and the subsequent action of the gastric juice.

DIPHTHERIA AND DAMPNESS OF SITE.

In a paper published in these columns on Sept. 6, 1878, Dr. Thursfield, who has had great experience in diphtheria, expressed a strong opinion that there is the closest connection between dampness of site and that disease (vol. ix, p. 149). The correctness of this view is amply borne out by the reports of other medical officers of health, and it has received very striking corroboration in the circumstances of some outbreaks of diphtheria, recorded by Dr. Woodforde in recently published reports. In an outbreak of diphtheria at Purley in the Bradfield rural district in 1878, the cottage in which the earliest cases appeared was much shut in by trees, and although very clean, it was damp and insufficiently ventilated, especially as regards the sleeping rooms. Moreover, the privy cesspit was also but a few feet from the windows; and the well, though sunk 100 feet into the chalk, yielded water giving clear proof of organic pollution. All the children in the house were attacked; but in the early part of this illness, and before medical advice was obtained, they continued to attend school, and thus conveyed the infection to three or four other families. Diphtheria proved unusually fatal during the years 1877 and 1878 at Ramsbury, in the Hungerford rural district, where ten pauper cases (out of sixteen reported for the entire district) occurred in 1878, of which four died. So far as ordinary sanitary defects are concerned, this village is not much worse than others, but many of the cottages are so constructed and arranged that they can hardly be made healthy, the sites of some being almost level with the river, and damp, with the subsoil water very near the surface. In consequence of repeated and serious outbreaks of diphtheria in Clifton Hampden, near Abingdon, for some years successively, Dr. Woodforde carefully examined the whole of the village. The ordinary defects of porous cesspits and polluted water were noted, though not to so great an extent as in some other places from which the disease has been entirely absent. In addition to these matters, the village generally appeared damp, and there was an evident stagnation of air from the large number of trees adjoining the cottages. Dr. Woodforde suggested that these should be thinned, and this was done to some extent; a fierce gale blew down many more, so as to open up the village to a considerable extent, and the disease has not appeared there since. Undoubtedly, other general sanitary improvements have been carried out, but Dr. Woodforde is disposed to believe that the removal of the trees was by no means the least valuable of them. The village consists mainly of a row of detached cottages, built on a slight slope adjoining the Thames, and the lower part of it especially is rendered exceedingly damp by the river floods, and the dense and heavy vapours arising from the flooded marshy lands. For many years it would seem that little or no timber had been cut. The cottages were, therefore, much hemmed in by trees, and in visiting the village the general dampness and want of free ventilation always attracted particular attention. Towards the end of 1878, diphtheria appeared in a severe form in Pinkney's Green and Burchell's Green, in the Cookham rural district. The first attack (which was a fatal one), occurred at a fairly clean, but overcrowded cottage, six persons sleeping in two bedrooms. The only ventilation to the cesspit was into the 'hovel' in which the privy was placed, and in which rabbits were kept. At this house seven cases occurred, with two deaths. Dr. Woodforde attributes these repeated illnesses to foul gases from the cesspit, and to the overcrowed sleeping-rooms. The infection was apparently partly by attendance at the same school, and also by the ignorant folly of the parents of the child who was first taken ill, in allowing some of her schoolmates to come to the cottage, and see her in her coffin. In all, nearly twenty cases occurred in eight families, of which six proved fatal. With two exceptions, the premises, when the attacks took place, were in passable condition, though at Burchell's Green the cottages invaded were damp, being situated in a wet lane, and their drinking-water was also unsatisfactory, coming from an unfenced spring liable to pollution by animals, ducks, etc.

POOR-LAW AND SANITARY BUSINESS.

Mr. T. C. Langdon's report to the Local Government Board on the sanitary condition of the Wells Rural Sanitary District is important as affording an example of what we fear is too common a practice with rural boards of guardians. Mr. Langdon reports that the Wells Board of Guardians meets but once a fortnight, when sanitary and educational matters share the time which remains 'after the usual business.' This often lasts for several hours, and as the annual Report for 1878 of the Medical Officer of Health, dated February 8th last, had not been read three months later, it would seem that but insufficient time can remain for such other subjects. The result of this of course has been that much of the district is in a lamentable state as regards sanitary essentials, and it would seem highly essential to a more efficient

sanitary administration of the district that more time and attention should be devoted to the sanitary business than can possibly be done at the end of the ordinary meetings of the guardians. Under a different arrangement the recommendations of the Medical Officer of Health would doubtless receive more consideration than they hitherto have done, and opportunity would be afforded for conferring at regular intervals with the sanitary officers as to conditions affecting health in the district. Mr. Langdon gives an account of the sanitary circumstances of each place in the district, and from this it appears that the water-supply is in some portions of the district much contaminated, and in others so circumstanced that it is liable to pollution by means of excremental and surface soakage. Although there is in many places an abundance of water, yet it is often not available for the purposes of the population, either because it is allowed to run to waste, or because it is not brought within reasonable reach of their houses. Where springs are used they are not sufficiently protected at their source, and along their channels are not subject to the supervision necessary to prevent their becoming fouled by means of surface drainage. Very generally the means of sewerage and drainage are defective. The privies generally are faulty in point of construction, and the cause of nuisance, owing to the large accumulations of human excreta, and to their contents often passing into open ditches in the vicinity of dwellings and public highways.

THE POLLUTION OF WATER.

In the *British Architect*, attention is directed to the constant production of typhoid, by the pollution of streams with sewerage, and an instance is quoted of a village in England, beautifully situated, where lately, among a population of two hundred, there were thirty cases of enteric fever. The neglect to make cesspools water-tight, so that there is no check to the percolation of fæcal matter into the soil, and thence into the wells, whence drinking-water is obtained, is also noted. The following suggestive anecdote is related *à propos* of the latter danger. A gentleman, living in a country house, found for several days the coffee and tea, and most of the cooked food, tasted strongly of carbolic acid. On inquiring into the cause of this, he found that his servant had been disinfecting the 'sink' and the 'closet' with the liquid solution, which had found its way from those places into the well from which the water used by the family was obtained. It thus turned out that this gentleman and his family had been all along drinking sewage-tainted water, which unpleasant fact was only discovered by the irruption of the carbolic acid.

VERY STALE BUTTER.

At the last meeting of Public Analysts, Mr. G. W. Wigner, F.C.S., and Professor Church, M.A., F.C.S., read a paper on Two Ancient Samples of Butter. The first was a sample of Irish bog butter, and its probable age was judged to be about one thousand years. The sample contained nearly four per cent. of curd, which consisted partly of vegetable matter derived from the bog, but contained quite enough animal matter to prove that the butter had been originally made from animal milk, and was not a mere artificial fat. Its fatty character had, however, been entirely changed, and the glycerides of which the fat originally consisted had been decomposed, so so as to leave simply a mixture of the fatty acids which constitute the acid portion of animal fats. The butter had in fact become changed into a substance closely resembling in character and composition the substance of which good composite candles are composed. The result is singular, as showing that length of time, combined with exposure to moisture, will effect the decomposition which the manufacturer of stearine has to effect by the agency of heat and acids. The other and older sample of butter had been taken from an alabaster vase in an Egyptian tomb. It had evidently been melted, and poured into the vase, and carefully sealed over. This sample was probably about 2,500 years old; but the preservation had been so perfect, that it was only slightly rancid, and had fully retained the chemical properties of genuine butter, the fats not having been decomposed to any sensible extent. This sample possessed a decided taste and smell of butter, while the sample from the bog was cheesy rather than buttery in smell.

SEWAGE FARMING.

At the last monthly meeting of the Council of the Royal Agricultural Society, under the presidency of the Duke of Bedford, the report of the judges of sewage farms (Mr. C. S. Read, M.P., Mr. Baldwin Latham, and Mr. T. H. Thursfield) entered to compete for the prizes offered last year was read, and in accordance with their recommendations the Council decided to award the prize (of £100) in Class 1, for farms utilising the sewage of not more than 20,000 people, jointly to the Corporation of Bedford and to Lieutenant-Colonel A. S. Jones, V.C., of Wrexham, their respective farms being, in the opinion of the judges, equal in merit. In Class 2, for farms utilising the sewage of more than 20,000 people, the prize of £100 was awarded to the Earl of Warwick, for the Leamington Sewage Farm. A special prize of £25 was given to Mr. R. S. Brundell in connection with the sewage farm of Doncaster, which was stated to be an admirable example of thrifty management, and showed how sewage can be applied to general farming. The sewage farm of the Birmingham, Tame, and Rea District Drainage Board was highly commended. It will be *apropos* of these decisions to call attention to the fact that the German Commission from the Duchy of Brunswick—who visited England during the past summer, to examine and report on the various farms and systems of sewage treatment adopted in this country—have declared that they considered the method of sewerage and sewage disposal adopted at Abingdon was the best they had seen. As the sewage farm of Abingdon is an example of a combination of surface irrigation with intermittent filtration, we should like to know why it was withdrawn from competition for the prizes of the Royal Agricultural Society. At Abingdon, we are informed, the sewaged land has been let on lease at a rent which will pay three per cent. on the purchase money of the land, while the Sanitary Authority at the same time has been relieved of all trouble and expense in the distribution of the sewage.

THE PUBLIC HEALTH

DURING JANUARY 1880.

The first four days of January were warm, and showed an average daily excess of 7.0°, compared with the mean temperature for the corresponding

period in the twenty years ending 1868. Cold weather prevailed throughout the last 27 days of the month, and the average daily deficiency of temperature was no less than 7.°4. The eleven days from 19th to 29th were severely cold. The mean temperature of the month at the Royal Observatory, Greenwich, was but 33.°2, and although 1.°4 higher than the exceptionally low temperature of January 1878, was 3.°1 below the average January temperature in 100 years. This low temperature during last month caused an excessive fatality of diseases of the respiratory organs, and probably increased the rate of mortality due to measles and whooping-cough. Less than the third of an inch of rain was measured during January, which was 2.3 inches below the average amount for the month, in 61 years.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, and containing a population of seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 21,155 births and 14,933 deaths were registered during the four weeks ending 31st January last. The births were equal to an annual rate of 36.8 per 1000 of the estimated population in the twenty towns; the birth-rate was equal to 36.5 in London, and averaged 37.1 in the nineteen provincial towns. The deaths registered in the four weeks of January were equal to an annual rate of 26.0 per 1000, against 23.7 and 29.0 in November and December. The January death-rates in those towns in 1877, 1878, and 1879 were equal to 22.3, 25.6, and 27.7 per 1000 respectively.

The lowest annual rate of mortality during January in the twenty towns was 20.9 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow: — Brighton, 21.0; Wolverhampton, 21.5; Leicester, 21.8; Oldham, 21.9; Bradford, 21.9; Leeds, 22.0; Norwich, 22.2; Sheffield, 22.6; Sunderland, 22.8; Bristol, 23.0; Newcastle-upon-Tyne, 24.4; Birmingham, 24.9; Salford, 25.5; London, 27.0; Nottingham, 27.0; Hull, 29.0; Liverpool, 29.1; Manchester, 29.6; and the highest rate during the week 30.4 in the borough of Plymouth. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate in January averaged but 24.8 per 1000, whereas it was equal to 27.0 in London. The relative excess of mortality in London, compared with the provincial towns, was larger in January than it had been in the preceding month. The high death-rates in Nottingham, Hull, Liverpool, and Plymouth, were in great measure due to the excessive fatality of zymotic diseases; the excess in Manchester, however, cannot be thus explained, for the death-rate from the seven zymotic diseases was below the average rate in the twenty towns.

The 14,933 deaths from all causes in the twenty towns last quarter included 2,204 which were referred to the seven principal zymotic diseases: 817 resulted from whooping-cough, 541 from scarlet fever, 493 from measles, 138 from fever (principally enteric), 115 from diarrhœa, 73 from diphtheria, and 27 from small-pox. These 2,204 deaths were equal to an annual rate of 3.8 per 1,000 in the 20 towns during the four weeks under notice, against 3.8 and 4.1 in the two preceding weeks. The zymotic rate was 3.4 per 1,000 in the 19 provincial towns, and was equal to 4.3 in London. The death-rate from these diseases last month did not exceed 0.5 in Brighton, 0.7 in Wolverhampton, and 1.0 in Portsmouth. It ranged upwards in the other towns to 4.5 in Nottingham, 4.6 in Salford, 9.0 in Hull, and was equal to 9.9 per 1,000 in Plymouth. Whooping-cough was the most fatal zymotic disease in these towns last month, and caused 567 deaths in London, and but 250 in the provincial towns. In addition to London, the fatal cases of whooping-cough were proportionally excessive in Salford and Newcastle-upon-Tyne. Scarlet fever was also more fatal last month in London than in the provincial towns; the fatal cases showed the largest excess in Liverpool, Sunderland, and Newcastle-upon-Tyne. Measles showed epidemic fatality in Plymouth, Nottingham, Liverpool, Leeds, and Hull. Of the 73 deaths referred to diphtheria in the 20 towns, 44 occurred in London and 29 in the provincial towns. The fatality of fever (principally enteric) was proportionally the same in London and in the provincial towns. Of the twenty-seven fatal cases of small-pox registered during the four weeks, one was registered in Bristol, and all the remaining twenty-six in London; not a single death from small-pox was registered in any of the eighteen other large provincial towns. Small-pox showed increased prevalence and fatality in London during January, and the Metropolitan Asylums Hospitals contained 84 and 80 patients respectively at the end of the last two weeks of the month. The new cases of small-pox, however, admitted to those hospitals during January averaged 20 per week, against 11 in the five weeks of December.

The temperature, which, as we have seen, continued generally low during January, caused an excessive fatality from lung diseases. The average weekly number of deaths referred to diseases of the respiratory organs in London, which had been successively 168, 301, 470, and 702 in the last four months of 1879, declined to 571 during the four weeks of January. The annual death-rate from these diseases in London, which had been equal to 10.1 per 1,000 during December, declined to 8.1 per 1,000 in January. Through the co-operation of so many of the Medical Officers of Health in these twenty towns, the accompanying table affords the means of studying the variations in the fatality of these diseases during last month in many of the larger as well as in nearly all the smaller urban sanitary districts. The death-rate from diseases of the respiratory organs ranged, in those of the twenty towns furnishing returns, from 3.2 and 4.5 per 1,000 in Sunderland and Newcastle-upon-Tyne, to 9.1 in Liverpool, 9.3 in Plymouth, and 10.4 in Manchester. Much light is thus thrown upon the wide range of rates of mortality in these urban sanitary districts.

In the outer ring of suburban districts around London (having a population little short of a million of persons) the annual death-rate from all causes in January did not exceed 19.3, and the zymotic rate was but 2.0 per 1,000. The corresponding rates in inner or registration London were, as before stated, 27.0 and 4.3 per 1,000 respectively.

It is satisfactory to be able to include in the accompanying table, which relates to the first month of 1880, *uniform* mortality statistics for 151 urban sanitary districts. In the corresponding tables for the six preceding months the number of contributing sanitary districts steadily increased from 36 to 120. Promises of further prospective support encourage the hope that this number will steadily increase in future, and we cannot doubt that the publication of these entirely trustworthy monthly statistics will prove of increasing value to medical officers of health, sanitary authorities, and the now large public that interests itself in sanitary matters. The increase

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Abingdon	6,033	22	15	2	7	1	..	..	5	9	..	8	..	..	1	..	..	2	..	..	..	43.1	29.4	17.6	3.9	W. T. G. Woodforde, M.D.
Accrington	30,000	89	49	10	9	..	3	19	8	2	..	..	..	..	..	..	2	11	3	..	..	34.9	19.2	0.8	4.3	J. Ewart.
Acton†	14,000	55	23	5	4	..	..	7	7	2	..	..	..	..	..	2	..	9	2	..	..	51.2	21.4	1.9	8.4	T. Francis.
Altrincham	11,990	28	24	6	6	2	..	6	4	4	..	..	..	..	3	1	..	8	2	..	..	27.5	23.6	3.9	7.9	G. H. Atwell.
Ashton-under-Lyne	33,417	128	95	14	18	5	4	31	23	4	..	2	..	..	..	2	..	23	16	..	21	45.1	33.5	1.4	8.1	W. H. Hughes.
Aston Manor	51,408	191	82	29	9	3	4	22	15	7	..	1	1	1	3	..	1	24	6	3	..	43.7	18.8	1.6	5.5	H. May.
Banbury	13,500	*	17	5	3	..	..	4	5	..	..	..	..	..	..	..	..	3	2	1	..	*	14.8	0.0	2.6	R. Grimbly.
Bangor	7,835	*	9	1	..	..	..	2	6	1	..	1	..	..	..	..	..	2	..	..	..	*	13.5	1.5	3.0	H. Rees.
Barnsley	30,000	110	77	21	24	*	*	*	16	15	..	..	11	..	..	2	2	23	2	2	10	43.2	30.2	5.9	9.0	M. T. Sadler, M.D.Lond.
Barrow-in-Furness	40,000	138	47	18	12	1	3	8	5	6	..	1	3	1	1	..	..	7	4	2	..	40.6	13.8	1.8	2.1	J. Settle.
Bath	53,649	107	138	19	7	8	10	28	64	23	16	5	1	1	..	..	..	22	11	1	25	23.5	30.3	5.0	4.8	A. B. Brabazon, M.D.
Batley	29,851	85	60	11	17	1	3	17	11	6	..	2	2	..	1	1	..	17	4	..	..	33.5	23.7	2.4	6.7	W. Bayldon.
Beccles	5,000	16	8	1	1	..	1	..	5	..	..	..	..	..	..	..	..	1	1	..	2	37.6	18.8	0.0	2.4	E. B. Crowfoot, M.B.
Bilston‡	25,000	*	63	*	*	*	4	*	*	5	..	1	2	..	..	1	1	*	*	*	*	*	26.3	2.1	*	W. M. Hancox.
Bingley	9,000	17	17	1	2	..	1	3	10	2	..	1	..	..	..	..	1	9	3	..	..	22.3	22.3	2.6	11.8	J. W. Craig, M.D.
Birmingham†	394,738	1252	749	191	154	31	28	197	148	89	..	24	17	8	22	4	14	185	82	39	116	41.3	24.7	2.9	6.1	A. Hill, M.D.
Bishop Stortford	7,024	*	9	..	2	1	..	3	3	..	..	..	..	..	..	..	..	3	..	..	1	*	15.1	0.0	5.0	W. Ogle, M.D.
Bolton†	105,000	323	215	49	56	15	5	52	38	47	..	25	3	..	12	2	5	50	15	8	3	40.1	26.7	5.8	6.2	E. Serjeant.
Bootle-cum-Linacre	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. J. Spraekling.
Boston†	15,000	32	18	1	..	1	..	6	10	..	..	..	..	..	..	..	..	2	3	..	..	27.8	15.6	0.0	1.7	W. Clegg.
Bradford†	197,196	472	331	79	69	22	12	83	66	34	..	6	9	4	10	..	5	77	31	8	24	31.2	21.9	2.2	5.1	H. Butterfield.
Bridgnorth	6,000	*	13	3	1	..	1	2	6	3	..	1	..	..	..	..	2	..	1	..	..	*	25.5	5.9	0.0	A. Mathias.
Bridgwater	13,000	44	25	4	2	1	3	4	11	1	..	..	..	..	..	1	..	12	4	1	9	39.9	22.6	0.9	10.9	F. J. C. Parsons.
Bridport	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. M. Evans.
Brighton	107,321	246	173	32	*	*	*	*	60	4	..	1	..	..	2	..	1	*	*	7	19	29.9	21.0	0.5	*	R. P. H. Taaffe, M.D
Bromley (Kent)†	14,293	*	22	2	7	..	..	2	8	6	..	4	..	..	2	..	..	7	1	..	..	*	20.1	5.5	6.4	C. O. Baylis, M.D
Bristol	213,536	542	376	82	*	*	*	*	107	54	1	11	21	..	16	4	1	*	*	12	56	33.1	23.0	3.3	*	D. Davies.
Bromsgrove	6,967	22	15	3	4	..	..	3	5	..	..	..	..	..	..	..	..	3	1	..	4	37.2	25.3	0.0	5.1	C. Carey.
Burslem	29,159	78	46	15	9	5	2	10	5	2	..	..	..	..	1	1	..	9	3	4	..	31.5	18.6	0.8	3.6	J. M. Taylor.
Burton-upon-Trent	33,000	163	76	18	21	6	4	15	12	17	..	1	14	..	..	..	2	18	8	1	8	58.2	27.1	6.1	6.4	C. Perks.
Bury	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. B. Bott, M.D
Bury St. Edmunds	15,600	44	26	10	2	..	2	6	6	1	..	..	..	..	1	..	..	9	2	..	3	33.2	19.6	0.8	6.8	F. W. Clark
Camborne	15,000	*	36	11	5	2	3	5	10	7	..	..	..	..	7	..	..	4	3	1	..	*	28.3	5.5	3.1	E. S. Angove.
Cambridge	34,500	103	50	11	2	1	4	16	16	2	..	..	..	..	1	..	1	7	6	2	6	35.2	17.1	0.7	2.4	B. Anningson, M.D.
Canterbury	20,962	39	37	7	3	1	1	11	14	1	..	..	..	1	..	..	1	15	4	2	8	21.9	20.8	0.6	8.4	F. Wacher.
Cardiff	82,364	275	134	35	30	2	5	43	19	15	..	2	4	1	7	..	1	24	20	6	10	39.3	19.2	2.1	3.4	H. J. Paine, M.D.
Carnarvon	10,407	23	21	1	2	3	1	6	8	1	..	..	..	1	..	..	..	7	3	1	..	26.0	23.8	1.1	7.9	H. Rees.
Chelmsford	9,700	20	12	2	1	..	..	3	6	..	..	..	..	..	..	..	..	..	2	..	3	24.3	14.6	0.0	0.0	E. H. Carter.
Cheltenham	45,000	105	87	21	2	2	6	15	41	2	..	..	1	..	..	..	1	22	3	2	7	27.5	22.8	0.5	5.8	T. Wright, M.D.
Chiswick	12,000	48	18	8	5	..	2	1	2	2	..	1	1	..	..	..	..	6	3	..	..	47.1	17.7	2.0	5.9	F. C. Dodsworth, jun.
Colchester	28,633	79	55	9	7	1	3	13	22	4	..	..	..	..	3	1	..	11	8	..	7	32.5	22.6	1.6	4.5	E. Waylen.
Congleton‡	12,000	32	21	7	4	2	..	3	5	4	..	2	..	1	..	1	..	5	2	..	..	27.8	18.2	3.5	4.3	P. M. Davidson.
Coseley	23,000	79	55	15	10	1	1	10	18	7	..	1	..	..	1	4	1	13	4	..	..	40.5	28.2	.6	6.7	J. Eagleton.
Coventry	41,000	127	70	11	9	3	4	22	21	5	..	..	4	..	..	1	..	11	10	..	7	36.5	20.1	1.4	3.2	M. A. Fenton, M.D.
Croydon	70,000	207	134	28	24	4	3	25	50	19	1	12	3	1	1	1	..	32	7	2	21	34.8	22.5	3.2	5.4	C. W. Philpot, M.D.
Dartford	9,531	35	30	8	4	1	2	8	7	3	..	1	..	..	2	..	..	1	2	..	3	43.3	37.1	3.7	1.2	E. Moore.
Derby‡	80,385	301	154	29	22	13	9	37	44	13	..	..	8	..	..	2	3	35	6	5	22	39.1	20.0	1.7	4.5	W. Iliffe.
Devonport†	50,000	*	139	20	65	5	5	17	27	59	..	54	..	..	5	..	..	24	8	1	9	*	36.2	15.4	6.3	J. May, jun.
Dorchester	7,400	35	9	5	..	..	..	..	4	..	..	..	..	..	..	..	..	4	..	..	..	55.7	14.3	0.0	6.4	E. J. Day.
Dover	33,636	101	51	8	6	3	3	11	20	4	..	2	..	..	..	1	1	16	1	2	7	35.4	17.9	1.4	5.6	M. K. Robinson, M.D.
Droitwich†	3,600	5	8	2	1	..	..	2	3	..	..	..	..	..	..	..	..	1	1	1	..	18.1	28.8	0.0	3.6	H. Swete, M.D.
Eastbourne	18,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	E. F. Fussell, M.B.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JANUARY 1880.—*Continued.*

Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 years	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
East Dereham	5,791	14	8	1	2	..	..	..	5	2	..	..	..	..	1	1	..	2	..	..	..	28.5	16.3	4.1	4.1	H. B. Vincent.
Fenton	14,000	33	24	7	7	2	1	4	3	1	..	..	1	..	..	..	..	3	5	1	..	27.8	20.2	0.8	2.5	A. V. Griffiths.
Finchley‡	11,389	21	12	1	..	..	..	4	7	..	..	..	..	..	..	..	..	6	..	..	..	24.0	13.7	0.0	6.9	J. Turle, M.D.
Glossop	17,472	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Rhodes.
Gloucester	37,907	120	69	24	4	1	3	15	22	1	..	..	..	..	..	..	1	26	2	..	6	37.3	21.4	0.3	8.1	J. P. Wilton.
Gorton†	32,000	108	80	27	20	6	2	18	7	16	..	5	7	1	2	1	..	13	8	..	..	35.2	26.1	5.2	4.2	R. E. Hammond.
Great Driffield	6,033	14	11	5	..	..	..	3	3	..	..	..	..	..	..	..	..	3	..	..	..	27.3	21.5	0.0	5.9	D. Ridpath, M.D.
Guildford	9,996	26	7	2	..	..	..	2	3	..	..	..	..	..	..	..	..	2	..	..	..	30.6	8.2	0.0	2.4	J. Morton, M.D.
Halifax	72,000	186	138	25	23	*	*	*	24	8	..	..	6	..	..	1	1	29	15	..	10	30.4	22.6	1.3	4.7	D. Ainley.
Hinckley	7,500	21	19	10	3	1	..	2	3	3	..	..	1	..	..	1	..	6	1	..	..	33.0	29.8	4.7	9.4	W. H. Griffiths.
Hindley†	12,000	51	50	12	14	8	5	8	3	15	..	..	14	..	..	..	1	11	10	4	..	55.4	54.3	16.3	11.9	J. G. Brayton.
Huddersfield†	81,780	195	110	30	16	6	2	20	30	4	..	2	1	..	..	1	24	14	4	7	31.1	17.5	0.6	3.8	J. S. Cameron, M.D.
Hull	149,627	*	348	118	85	14	17	35	79	109	..	80	5	..	16	3	5	63	19	17	24	*	27.4	8.6	5.0	J. F. Holden.
Ilfracombe	5,350	11	3	..	1	..	..	1	1	..	..	..	..	..	..	..	..	1	1	..	..	24.2	6.6	0.0	2.2	E. J. Slade-King, M.D.
Ilkeston‡	12,356	64	25	10	3	2	2	6	2	1	..	..	..	..	..	1	..	3	2	1	..	54.0	21.1	0.8	2.5	R. Wood.
Ipswich†	47,414	110	95	16	30	*	*	*	25	18	..	2	..	2	13	..	1	23	7	2	8	30.2	26.1	4.9	6.3	G. S. Elliston.
Jarrow†	23,000	54	34	10	6	2	5	9	2	4	..	..	2	..	..	2	..	9	1	..	1	30.6	19.3	2.3	5.1	J. Spear.
Keighley	24,000	87	51	9	9	3	2	13	15	6	..	..	1	..	4	1	..	17	2	..	7	42.7	25.0	2.9	8.3	A. Roberts.
Leamington	24,180	56	44	2	7	5	2	13	14	6	..	..	5	..	1	..	..	7	4	1	3	27.3	21.4	2.9	3.4	J. S. Baly.
Leeds	318,929	1069	704	158	146	*	*	*	160	60	..	23	12	1	9	6	9	186	53	*	50	39.5	26.0	2.2	6.9	G. Goldie.
Leek	12,527	39	31	6	2	..	1	9	14	1	..	..	..	..	..	1	..	16	..	..	1	36.7	29.1	0.9	15.0	J. J. Ritchie.
Leicester	129,912	360	217	63	*	*	*	*	49	36	..	16	14	..	5	..	1	*	4	4	40	36.1	21.8	3.6	*	W. Johnston, M.D.
Leigh	20,400	86	49	14	14	4	1	7	9	6	..	..	4	..	1	1	..	7	2	..	..	49.6	28.3	3.5	4.0	J. Hall.
Lichfield	8,129	24	14	2	2	1	..	3	6	1	..	..	..	1	..	..	..	4	..	..	..	34.8	20.3	1.4	5.8	G. A. Carter, M.D.
Lincoln	32,103	110	56	15	7	2	1	17	14	4	..	1	1	..	..	1	1	15	5	1	6	40.3	20.5	1.5	5.5	C. Harrison, M.D.
Littlehampton	4,300	9	3	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	24.7	8.2	0.0	0.0	C. Kelly, M.D.
Liverpool†	544,056	1703	1214	271	287	62	44	381	169	164	..	78	36	2	20	19	9	378	113	58	188	40.8	29.1	3.9	9.1	J. S. Taylor, M.D.
Liversedge	13,750	32	33	8	6	5	2	5	7	2	..	1	..	..	..	1	..	6	1	1	..	27.4	28.3	1.7	5.1	W. J. Sykes, M.D.
Luton	24,200	64	65	18	15	3	3	14	12	11	..	..	..	..	11	..	..	10	9	1	4	31.1	31.6	5.4	4.9	H. Sworder.
Lytham	5,000	10	5	1	..	1	1	..	2	..	..	..	..	..	..	..	..	1	..	..	..	23.5	11.8	0.0	2.4	W. E. Pountney, M.B.
Macclesfield	36,641	114	75	21	9	1	5	17	22	2	..	..	..	..	1	..	1	15	10	..	14	36.6	24.1	0.6	4.8	G. Bland.
Maidenhead	8,281	22	16	3	2	2	..	5	4	4	..	..	..	..	4	..	..	2	2	..	4	31.3	22.8	5.7	2.8	W. T. G. Woodforde, M.D.
Maidstone†	29,537	66	63	15	9	5	1	11	22	5	..	1	..	..	3	..	1	19	2	..	9	29.1	27.8	2.2	8.4	M. A. Adams.
Manchester	363,130	1055	823	179	*	*	*	*	150	90	..	15	24	4	33	3	11	289	*	26	136	37.9	29.6	3.2	10.4	J. Leigh.
Merthyr Tydfil†	52,000	114	103	17	12	5	6	25	38	8	..	..	1	..	5	1	1	25	5	4	6	28.6	25.8	2.0	6.3	T. J. Dyke.
Middlesbrough	53,580	167	92	27	11	11	7	25	11	17	..	..	9	..	..	6	2	19	11	2	11	36.7	20.2	3.7	4.2	J. A. Malcomson, M.D.
Middleton and Tonge‡	16,700	60	42	11	10	..	..	9	12	3	..	3	..	..	..	..	..	4	7	..	..	37.5	26.2	1.9	2.5	T. B. Knott.
Morley	12,100	40	27	7	9	1	2	3	5	2	..	2	..	..	..	..	..	11	2	..	..	38.9	26.3	1.9	10.7	S. T. Steele.
Neath	12,000	27	15	7	1	1	..	2	4	..	..	..	..	..	..	..	..	1	..	1	1	26.5	14.7	0.0	1.0	G. Ryding, M.D.
Newark	13,746	45	29	7	1	1	1	9	10	1	..	..	..	..	1	..	..	11	5	1	1	38 6	24.9	0.9	9.4	A. Ashby, M.B.
Newbury	9,906	28	16	3	1	2	1	2	7	..	..	..	..	..	..	..	..	3	2	..	1	33.3	19.0	0.0	3.6	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	40	35	6	2	..	2	16	9	1	..	..	..	..	1	..	..	3	5	..	..	26.2	22.9	0.7	2.0	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	437	280	62	55	*	*	*	*	41	..	..	17	1	20	..	3	52	24	..	38	38.1	24.4	3.6	4.5	H. E. Armstrong.
Norwich	85,827	235	146	34	*	*	*	*	51	27	..	2	13	1	9	1	1	*	*	8	18	35.7	22.2	4.1	*	T. W. Crosse.
Nottingham	173,627	550	388	77	87	31	19	92	82	67	..	43	13	..	3	4	4	91	38	10	29	37.3	26.3	4.5	6.2	E. Seaton, M.D.
Nuneaton	7,400	30	29	9	8	..	..	6	6	2	..	1	..	..	1	..	..	21	2	1	..	47.8	46.2	3.2	33.4	E. Peacock.
Oakworth†	6,000	16	6	1	1	..	..	1	2	..	..	..	..	..	..	..	..	2	..	..	..	34.8	13.0	0.0	4.3	F. W. Barry, M.D.
Oldham	115,413	304	194	47	37	5	10	56	39	21	..	2	5	1	10	1	2	50	24	6	14	34.4	21.9	2.4	5.7	J. M. Sutton, M.D.
Oxford†	37,500	95	74	17	8	3	4	21	21	5	..	4	..	..	1	..	..	18	11	1	8	33.0	25.7	1.7	6.3	A. Winkfield.
Pembroke	15,000	*	32	5	5	4	3	3	12	..	..	..	..	..	..	..	..	9	3	1	..	*	25.1	0.0	7.1	D. P. Saer.
Penzance	12,000	28	23	5	4	..	3	4	7	2	..	..	..	..	..	2	..	3	2	1	..	27.5	22.6	2.0	2.9	G. B. Millett.
Peterborough†	20,000	76	33	7	6	4	1	4	11	6	..	1	2	1	1	1	..	5	4	..	..	49.5	21.5	3.9	3.3	W. Thomson, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF JANUARY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
PLYMOUTH†	74,993	219	225	42	71	15	11	41	45	70	..	46	1	3	17	3	2	67	18	2	9	30.5	31.3	9.7	9.3	H. Greenway.
POOLE	11,530	23	19	2	1	..	2	8	6	2	..	..	..	..	..	2	..	4	5	..	3	23.5	19.4	2.0	4.1	H. A. Lawton.
PORTSMOUTH	134,224	411	238	40	32	11	11	62	78	11	..	4	..	..	1	5	1	74	28	5	30	31.9	20.9	1.0	6.5	G. Turner.
PRESTON‡	88,000	320	229	59	26	11	14	68	51	13	..	1	8	..	..	1	3	51	17	7	4	37.9	26.1	1.5	6.0	W. G. Gray (Dep.)
RAMSGATE	22,200	71	54	10	4	5	3	12	20	3	..	1	1	..	1	..	..	14	6	1	1	37.7	28.6	1.6	7.4	J. W. Barry.
READING	41,500	151	81	21	13	1	4	18	24	7	..	..	..	..	6	..	1	16	5	3	11	42.8	23.0	2.0	4.5	J. Shea, M.D.
REDDITCH	10,070	25	16	5	3	1	2	2	3	..	..	..	..	..	..	..	..	3	2	..	..	29.2	18.7	0.0	3.5	H. M. Page, S.Sc.C.Camb.
REDRUTH	9,500	28	10	1	2	1	1	3	2	..	..	..	..	..	..	..	..	3	2	..	..	34.7	12.4	0.0	3.7	J. S. Hichens.
REIGATE	18,000	60	25	4	1	1	2	1	16	1	..	..	..	..	..	..	1	6	1	..	..	39.2	16.4	0.7	3.9	E. L. Jacob.
RICHMOND (Surrey)	19,500	55	49	10	16	1	3	11	8	10	..	..	1	..	9	..	..	11	4	..	8	33.2	29.6	6.0	6.6	J. T. Rowland, M.D.
ROCHDALE	71,904	190	122	22	32	7	3	36	22	23	..	10	3	..	1	8	1	22	11	2	..	31.1	20.0	3.8	3.6	J. Henry, M.D.
ROCHESTER	18,500	61	54	11	11	1	..	17	14	5	..	1	1	..	3	..	..	15	3	2	14	38.8	34.4	3.2	9.5	J. Sladen-Knight, M.D.
ROTHERHAM‡	34,404	143	65	*	*	*	*	*	*	6	..	..	3	..	1	..	2	*	*	*	8	43.3	19.7	1.8	*	J. Hardwicke, M.D.
RUGBY	8,916	27	16	3	2	..	1	5	5	1	..	..	..	..	1	..	..	5	1	1	..	35.7	21.1	1.3	6.6	G. Wilson, M.D.
RUNCORN	14,000	43	16	8	1	..	..	3	4	..	..	..	..	..	..	..	..	8	1	..	..	36.2	13.5	0.0	6.7	R. H. Mouritz.
RYDE	12,800	*	28	4	2	1	1	5	15	1	..	..	..	..	1	..	..	10	..	..	2	*	25.8	0.9	9.2	A. Platt Wilks, M.B.
SALFORD†	185,786	590	363	95	83	19	18	94	54	66	..	4	13	2	41	4	2	83	43	4	54	41.4	25.5	4.6	5.8	J.Tatham, M.D., S.Sc.C.Camb.
SHEFFIELD‡	304,938	1010	661	163	133	*	*	*	130	73	..	12	17	1	16	12	15	178	64	15	67	34.5	22.6	2 5	6.1	T. W. Hime, M.B.
SITTINGBOURNE	9,000	24	19	3	10	..	..	4	2	2	..	..	..	..	2	..	..	6	1	..	..	36.0	28.5	3.0	9.0	H. G. Sutton.
SKIPTON‡	9,500	21	13	3	..	2	1	7	..	1	..	..	1	..	..	..	..	3	3	1	2	28.8	17.8	1.4	4.1	F. W. Barry, M. D.
SMETHWICK	21,000	98	47	18	4	1	2	10	12	2	..	..	..	..	1	..	1	*	*	*	*	54.9	26.3	1.1	*	W. Sutton.
SOUTHPORT	34,100	89	69	13	7	3	4	22	20	2	..	..	..	..	1	1	..	13	8	2	..	30.7	23.8	0.7	4.5	H. H. Vernon, M.D.
SOUTH SHIELDS†	63,000	175	92	30	15	9	2	16	20	17	..	1	7	1	6	2	..	16	1	2	1	36.2	19.0	3.5	3.3	J. Spear.
STALYBRIDGE	23,124	84	42	11	6	1	1	10	13	3	..	1	1	..	..	..	1	20	6	..	..	42.8	21.4	1.5	10.2	F. J. Roberts-Dudley.
STOURBRIDGE	9,376	25	11	3	..	1	1	4	2	..	..	..	..	..	..	..	..	..	1	..	..	31.4	13.8	0.0	0.0	R. T. S. Eagar, M.D.
STROUD	7,665	17	19	6	2	..	..	5	6	..	..	..	..	..	..	..	..	5	1	..	4	26.1	29.2	0.0	7.7	T. Partridge.
SUNDERLAND‡	116,730	442	246	54	52	21	12	54	53	37	..	1	17	1	11	4	3	36	21	6	18	39.5	22.0	3.3	3.2	H. J. Yeld, M.D.
SWANSEA	65,890	213	154	25	53	16	7	31	22	50	..	..	43	..	..	7	..	32	12	6	4	38.1	27.5	8.9	5.7	E. Davies.
SWINTON‡	7,753	47	18	7	6	1	..	2	2	4	..	..	..	..	3	1	..	5	1	..	..	52.7	20.2	4.5	5.6	C. S. Blythman, M.B.
TAMWORTH	4,846	15	5	..	1	..	..	..	4	..	..	..	..	..	..	..	..	1	..	1	..	36.4	12.1	0.0	2.4	H. J. Fausset, M.D.
TAUNTON	16,227	46	34	8	2	1	..	8	15	2	..	..	..	..	1	..	1	8	4	..	3	33.4	24.7	1.5	5.8	H. J. Alford, M.D.
TEIGNMOUTH	7,000	20	19	5	3	1	..	4	6	4	..	..	..	..	4	..	..	8	..	..	..	33.6	31.9	6.7	13.4	W. C. Lake, M.D.
TIVERTON†	10,400	18	14	3	1	1	..	2	7	..	..	..	..	..	..	..	..	4	2	..	3	20.4	15.9	0.0	4.5	J. P. McNeill, M.D. (Dep.)
TORQUAY	26,000	*	57	11	10	1	1	11	23	10	..	1	2	..	7	..	..	12	2	..	..	*	25.8	4.5	5.4	P. Q. Karkeek.
TOTTENHAM†	35,000	128	61	18	8	1	2	14	18	4	..	1	1	..	1	..	1	20	5	..	..	14.7	11.8	5.9	2.9	R. W. Pendleton.
TOXTETH PARK	8,000	10	8	1	2	1	1	1	2	4	..	..	2	1	..	..	..	2	..	..	..	47.7	22.7	1.5	7.5	C. T. Conolly.
TREDEGAR	18,000	67	62	15	14	2	6	13	12	7	..	..	..	..	7	..	..	21	6	6	1	43.8	40.5	4.6	13.7	G. A. Brown.
TROWBRIDGE	12,000	18	14	1	6	..	1	3	3	4	..	..	4	..	..	..	..	2	1	..	..	17.7	13.7	3.9	2.0	G. C. Tayler, M.D.
TUNSTALL	15,300	48	33	8	7	2	1	10	5	1	..	..	..	..	..	..	1	10	1	..	..	37.0	25.4	0.8	7.7	J. P. Edwards.
WALLASEY†	20,000	48	17	4	1	2	1	3	6	..	..	..	..	..	..	..	..	3	..	..	2	31.3	11.1	0.0	2.0	I. Byerley.
WARRINGTON†	38,000	142	87	19	17	6	4	28	13	4	..	..	..	..	2	1	1	34	7	3	12	48.7	29.8	1.4	11.7	G. W. Joseph.
WEDNESBURY†	26,000	62	27	13	10	2	..	8	4	3	..	2	1	..	..	..	..	5	1	..	..	31.1	13.5	1.5	2.5	J. C. Garman.
WEST BROMWICH†	54,000	191	97	32	21	*	*	*	16	7	..	2	3	..	2	..	..	*	*	9	3	46.1	23.4	1.7	*	J. Manley.
WEST DERBY	33,693	87	46	9	6	6	3	14	8	10	..	1	5	..	3	1	..	17	7	..	..	30.4	16.1	3.5	5.9	W. Carter, M.B.
WEYMOUTH	14,000	35	18	2	4	..	..	2	10	..	..	..	..	..	..	..	..	4	..	..	4	29.4	15.1	0.0	3.4	H. Tizard, M.D.
WIDNES	22,000	98	39	7	8	3	2	12	7	..	..	..	..	..	..	..	..	9	4	4	..	52.5	20.9	0.0	4.8	W. Cooper.
WIGAN	45,432	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. C. Barnish.
WILLENHALL†	19,300	57	31	8	5	3	2	8	5	1	..	..	..	..	..	..	1	6	3	4	..	38.5	20.9	0.7	4.5	W. H. Hartill.
WITHINGTON‡	15,000	39	22	3	6	1	1	7	4	2	..	..	..	..	..	2	..	7	..	3	..	27.1	15.3	1.4	4.9	T. C. Railton, M.B.
WOLVERHAMPTON‡	76,000	286	159	36	27	8	8	52	38	5	..	1	1	3	..	..	..	35	18	14	26	39.2	21.8	0.7	4.8	J. H. Love.
WORTHING	9,540	11	13	5	3	..	1	2	2	5	..	4	..	..	1	..	..	3	2	..	..	13.6	16.0	6.2	3.7	C. Kelly, M.D.
YORK	46,850	121	91	19	18	4	7	18	25	11	..	4	3	..	2	..	2	18	11	1	5	33.7	22.9	2.8	4.5	S. W. North.
YSTRADYFODWG	52,000	160	108	39	19	5	8	26	11	5	..	..	1	..	..	3	1	39	6	9	..	36.2	24.5	1.1	8.8	W. Rhys.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

in the number of our contributors, however, renders it all the more necessary to request medical officers of health to return their monthly cards as soon after the close of each month as they may find possible. Tabular work requires time and care at the hands of the printers, and in order that it may be possible that the SANITARY RECORD may be issued on the 15th of each month, it is necessary that these cards should be in the hands of the editor as early in the month as possible, and on the morning of the 7th at the latest. On the last day of January 179 post-cards were addressed to the medical officers of health of as many sanitary districts; of these cards, 151 were returned with the requested information in time for the publication of their statistics in our present issue. We hope that other medical officers who may have received cards will at their early convenience return them with a word or two of explanation, intimating whether in future they will find it possible to become contributors to our monthly table.

The estimated population of the 151 sanitary districts for which we publish statistics in the accompanying table for January is rather more than seven millions of persons. The annual birth-rate in those districts furnishing the number of births averaged 35.0 per 1,000, against 35.9, 34.9, and 33.1 in the three preceding months. The recorded birth-rate in January was exceptionally low (below 25 per 1,000) in Worthing, Trowbridge, Droitwich, Canterbury, Bingley, Bath, Ilfracombe, and Littlehampton. It was exceptionally high, exceeding the rate of 50 per 1,000, in Acton, Ilkeston, Dorchester, Smethwick, Hindley, and Burton-upon-Trent. Exceeding low or exceedingly high birth-rates, if continually maintained, suggest the possibility of an error in the estimate of the population used for the calculation of the rates. In small districts, however, the registered numbers of births vary too much from month to month to allow of trustworthy conclusions being founded upon the returns for a single month.

The annual death-rate in the 151 urban sanitary districts averaged 24.2 per 1,000 of the estimated population in January, against 25.2 in 120 districts in December. The average rate in the twenty large towns was 26.0 per 1,000; it follows, therefore, that the death-rate in the smaller districts was considerably lower than that which prevailed in the larger town districts. The fatality of diseases of the respiratory organs, however, again showed a marked excess. The following sanitary districts may be noted among those showing very low death-rates from all causes (lower than 16 per 1,000) during January last:—Ilfracombe, Littlehampton, Trowbridge, Wallasey, Barrow-in-Furness, Neath, Banbury, Boston, Weymouth, and Tiverton. Death-rates exceeding 30 per 1,000 were recorded in Bath, Plymouth, Ashton-under-Lyne, Rochester, Devonport, Dartford, Nuneaton, and Hindley. Although several of these excessive rates were due to exceptional zymotic fatality, the excess appears in some instances to have been mainly caused by high rates of mortality from diseases of respiratory organs. In the 151 urban sanitary districts the annual death-rate from the seven principal zymotic diseases averaged 3.1 per 1,000 during January, against 2.8 and 3.0 in the two preceding months. In the twenty large towns, the death-rate from these diseases averaged 3.8 per 1,000. No death from any of these zymotic diseases was registered during January in 27 of these sanitary districts. The zymotic death-rate, however, showed a considerable excess in Bolton, Burton-upon-Trent, Derby, Devonport, Richmond, Rochdale, and Swansea. Small-pox caused sixteen more deaths in Bath; but with the exception of a single fatal case both in Bristol and in Croydon, no death from this disease was recorded in any other of the sanitary districts dealt with in our table. Measles fatality showed a large proportional excess in Abingdon, Bolton, Devonport, and Rochdale; scarlet fever in Barnsley, Burton-upon-Trent, Derby, Gorton, Hindley, and Swansea; and whooping-cough in Bolton, Camborne, Ipswich, Luton, Richmond, Torquay, and Tredegar. Eight deaths were referred to fever in Rochdale, 7 in Swansea, 6 in Middlesborough, 4 in Coseley, and 3 in Ystradyfodwg. The deaths from fever, principally enteric, in Swansea, which had declined from 30 to 6 in the four preceding months, were 7 in January.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 5.1 per 1,000 persons living in the 151 sanitary districts, against rates rising steadily from 2.2 to 7.4 per 1,000 respectively in the four preceding months. During January, the annual death-rate from these diseases showed a marked excess, and was equal to more than 10 per 1,000, in Mosley, Hindley, Warrington, Stalybridge, Newark, Tredegar, Leek, and Nuneaton. The fatality of lung diseases in the last-mentioned town was again exceptionally remarkable; the reported deaths from these diseases were equal to an annual rate of 35.0 and 33.4 respectively in December and January. During January, the annual death-rate from all causes in the urban sanitary district of Nuneaton was equal to 46.2 per 1,000 of the population, of which 33.4 per 1,000 was referred to diseases of the respiratory organs.

Infant mortality, measured by the proportion of deaths under one to births registered, averaged 157 per 1,000 in these urban sanitary districts; in the twenty large towns the death-rate of infants averaged 161 per 1,000 births during January, against 182 in December. The infant death-rate in London, owing partly to the exceptional fatality of whooping-cough, was equal to 168 per 1,000 last month, whereas in the aggregate of the nineteen provincial towns it did not exceed 154. In the smaller urban sanitary districts the proportion of infant mortality was exceptionally high in Barnsley, Cheltenham, Gorton, Gloucester, Luton, Preston, and Ystradyfodwg. In the last-mentioned sanitary district infant mortality was equal to 244 per 1,000 of the births registered.

We hope for a further addition to the number of contributing sanitary districts in our next issue, and in the meantime we shall be glad to furnish prepaid post-cards, for the transmission of these monthly figures, to any Medical Officer of Health who finds himself able to co-operate in our effort to publish uniform, and completely trustworthy, mortality statistics relating to the precise areas of urban sanitary districts. The Registrar-General's practice of publishing mortality statistics for the registration sub-districts most nearly corresponding with the areas of small towns and watering-places is open to considerable objection, from which our statistics of urban sanitary districts is entirely free. Watering-places and health-resorts have frequently complained of the mortality statistics published once a year by the Registrar-General. The area and population of such places is often small, and statistics for the entire registration sub-district in which they happen to be situated cannot always be taken as fairly representative of those for the watering-places proper. The

accompanying tables contain statistics for thirteen watering-places, namely:—Bangor, Brighton, Dover, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weymouth, and Worthing. The average death-rate from all causes in these thirteen watering-places did not exceed 21.2 per 1,000, and the zymotic rate was only 1.5 per 1,000. We should be very glad to see such important watering-places as Whitby, Scarborough, Yarmouth, Lowestoft, Margate, Folkestone, Llandudno, and Blackpool in our list of contributing sanitary districts, and we doubt not that such publication would conduce to the best interests of those places.

SPECIAL REPORTS.

SEWAGE DISPOSAL.

AT a recent meeting of the Society of Engineers, a paper was read by Mr. Henry Robinson, C.E., on 'Sewage Disposal', of which the following is an abstract:—The author, in the first place, described the different systems which are employed for the removal of the refuse of the community, and the advantages and disadvantages of each. In referring to the adoption of the pail system, he stated that the retention of the fæcal matter, for even a short time, in movable receptacles in dwellings, however carefully the system may be administered, involved necessarily a risk of nuisance and a further objection in the visible removal of it. Perhaps this was partly sentimental, but still the removal from a house in pails or tubs of the fæcal matter produced in it is hardly in accordance with the civilisation of the period, and considering that a system of sewers was necessary even where the pail method was employed, the adoption of it means duplicate systems for getting rid of the refuse from the houses, the economy of which was open to grave doubt. He showed that in any case the water-carriage system was a necessity in order to effect the removal of the slop water and other fluid refuse which cannot be got rid of by any receptacle for other refuse. After such a system had been introduced in a town it appeared natural that it should be utilised to enable the excrementitious matter from houses also to be conveyed away by it. Wherever sanitary authorities discouraged the water-closet system and the connection of closets with the sewers, he expressed an opinion that they could not legally prevent the connection being made. Even where the pail system existed it was probable that as the inhabitants experienced the convenience of the water-carriage system they would insist on exercising their right of resorting to the sewer to get rid of their water-closet refuse. He then gave the following as the ascertained average composition of a gallon of sewage:—

Organic matter	...	...	27.72 grains
Nitrogen ...	...	...	6.21 ,,
Phosphoric acid	...	...	1.57 ,,
Potash	...	...	2.02 ,,

The dangers attending bad house drainage and defective sewage were referred to, and the author stated that although a great advance had been made of late years in the degree of attention which was given to these matters, it was nevertheless a fact that owing to the permissive nature of sanitary legislation, to the cost attending the introduction of sanitary improvements, and to the ignorance or apathy of the authorities, there was a great deal more preventible disease in the country than there ought to be. London did not escape from this implied censure on sanitary authorities, as the vestries (which were the sanitary authorities for London, but free from the control of the Local Government Board) seldom exercise the powers vested in them to inspect the house connections and to enforce a compliance with the rules which govern proper house drainage in connection with a system of town sewerage. Even where care was taken in regard to the removal of the refuse there was an utter neglect as to preserving the water-supply free from contamination, and where it was supplied in a pure state by the water companies it frequently became polluted before consumption by storage in cisterns which were never properly cleaned. Whilst advocating a constant supply from the water companies, he condemned the neglect of the householders who did not attend to the proper cleaning of the cisterns. In regard to house sanitation, he showed that Clauses 82, 83, and 84 of the Metropolis Local Management Act of 1855, gave power to the vestry to inspect the internal arrangement of houses, to require the occupier to rectify defects which are injurious to health, or in the event of his neglecting to do so, the necessary work could be done and charged against him. There appeared to be no hope of progress in sanitary matters commensurate with the gravity of the subject, until there was a more vigorous enforcement of existing sanitary legislation. The author was favourable to the removal of all health matters from the sphere of local influence and to have a special department of health.

The author then considered the operations of the Rivers Pollution Prevention Act of 1876, and expressed an opinion that (so far as the fouling of rivers by sewage was concerned) it had been productive of far less good than had been anticipated. This was chiefly owing to the want of latitude in regard to what was a reasonable system, to effect such a purification of the sewage as would be consistent with the various circumstances of the towns upon the authorities of which devolved the duty of adopting some system. Some were practically doing nothing, owing to its being regarded as a *sine qua non* that land and only land was the ultimate destination of sewage, whether it could be reached in a reasonable distance or not, and regardless of its adaptability to sewage purification.

In speaking of the Rivers Pollution Prevention Act, he referred to the singular exemption in favour of the Thames and the Metropolitan Sewage, and pointed out that the Metropolitan Board of Works was created in 1855 for the purpose of sewering London and of purifying the Thames. This duty was imposed on the Board at its formation, and it has fulfilled it to the extent of executing an admirable system of sewerage. The outfalls at Barking and Crossness were supposed to remove the sewage to where it no longer polluted the river or the Metropolis, but it was generally considered that a large portion of the sewage returned to pollute the river within the Metropolitan area, and that the Board of Works had only partially accomplished the work of sewage disposal for which it was specially created. In Clause 3 of the Metropolis Local Management Act Amendment of 1858, it expressly stated that the powers conferred by the original Act of 1855 should

'extend and be applicable as well to works for deodorising sewage'. This clearly indicates that at that time it was contemplated to apply some treatment to the sewage at the outfalls before its discharge into the river. The Conservators of the river Thames were, however, supposed to have the power of preventing the Metropolitan Board from continuing this pollution, but the powers of the Conservators as regards pollution appeared from their Act of 1867 to be confined to the preservation of the purity of the river to the western boundary of the Metropolis.

The Conservators had somewhat tardily taken action with respect to the outfalls under the 20th and 21st sections of the Thames Conservancy Act of 1870, on the ground that they have injuriously affected the navigable channel by the formation of mud banks. These sections of the Act provided that any banks or other obstruction to navigation which resulted from the discharge of London sewage into the river must be rectified at the expense of the Metropolitan Board. This (or the commercial) part of the case was now being dealt with by arbitration, and the award of the umpire will be made in the form of a report to the Board of Trade. The author observed that it would be noticed that the sanitary aspect of the question was not gone into, the present inquiry being limited to what might be termed the commercial part of the subject, namely, whether the Board of Works or the Conservators were to bear the cost of dredging certain mud banks. The result of this arbitration would doubtless influence the sanitary part of the case, but it would have been more satisfactory had the consideration of the question as bearing upon the public health been regarded as of equal importance to the consideration of it in reference to an interference with the river bed. The dissolved and lightly suspended impurities in sewage might float up the river as far as Richmond (as they are alleged to do), decomposing and polluting the air without adding a cubic yard to any bank interfering with the channel, and yet infinitely more mischief might result. From calculations which the author had made he considered that the sewage of the metropolis could be dealt with by chemical treatment at the present outfalls for about 7d. per head of the population, and the sludge produced converted into a portable semi-dried manure capable of being utilised on land like farm-yard manure. He considered that sludge, from an efficient chemical system, would in time repay part of the cost.

The author then dwelt at great length on the results of applying sewage either to land or of treating it with chemicals. He stated that thoroughly drained land where it could be obtained was the best way of purifying and utilising sewage by converting the nitrogenous organic matters in sewage into nitrates. These, however, he showed from careful experiments and observation were not stored up in the soil for utilisation when required, but such as were not at once absorbed by vegetation passed through the ground beyond the reach of the plant roots. In other words, the fertility of land was not increased by applying larger volumes of sewage than the growing crops on the land could assimilate, and that all experience showed that however well land may act as a purifier of sewage for sanitary purposes, it could only be relied on to utilise the manurial constituents of the sewage according to the requirements of the crops for the time being assimilating them. Any excess of the supply of manure over the demand by the crops was not stored up for subsequent use, but was, agriculturally speaking, wasted and passed off in the subsoil drainage, either partially or wholly purified according to the nature of the land and of its preparation to filter and oxidise the sewage passed through it.

The author gave the following results of irrigation in the case of twenty-two towns employing that system which he had compiled :—

Average flow in gallons per head of population per day	39·3
Average number of population per acre of sewage farm	114
Average annual cost of sewage farm per head of population	1s. 10d.
Average annual cost of sewage farm in the £ of rateable value	6½d.

Reference was made to the various methods of treating sewage by chemicals and the lime process. Scott's process, the A B C process, and the Coventry process were explained, and the cost of each given. The author considered that sulphate of alumina had been proved to be a necessary constituent of a good chemical process.

With respect to the disposal of the sludge, he stated that if attention was given to the employment of chemicals which did not add materially to the bulk of the precipitated sludge, it could be converted into a portable manure by presses, and that it would repay the cost of its conversion.

The author, in conclusion, stated that each town must deal with its sewage difficulties in the way that was best suited to its circumstances, after carefully considering the conditions which governed the special case, and that it was indispensably necessary for those who were called upon to advise in these matters to not only be free from bias in favour of any one system, but to have a thorough practical experience in the several ways of disposing of sewage, as the adoption by a town of an unsuitable system was a step which, from a financial point of view, was irretraceable.

A long and interesting discussion followed the reading of Mr. Robinson's paper, in which Mr. Baldwin Latham, Mr. H. P. Stephenson, Mr. Alfred Williams, Mr. J. Shiress Will, Mr. Perry F. Nursey, Mr. G. E. Eachus, Mr. Brooking, and other gentlemen took part. The President, Mr. R. P. Spice, in closing the discussion, observed that it had been truly said they were dealing with a vexed question. The highest authorities were divided. There was no doubt that the sewage of towns and cities must be carried away by water, because water was the cheapest carrier; but then the question arose, where the engineer's duty was to end and the chemist's to begin. Were he an autocrat, he would not have the sewage poured into the Thames. It was, however, there; but he thought it should be taken to Maplin Sands, or at least so far down the river as to be less objectionable than it was at present.

SCARLATINA AND MILK.

THOUGH milk is clearly recognised as a possible carrier of scarlatinal poison, but few outbreaks of that disease traceable to an infected milk-supply have been reported, as compared with the now very numerous epidemics of milk typhoid. We believe that the outbreaks of scarlatina referred to in vol. vii, pages 49 and 69, and vol. x, page 306 of this journal, include all those in which milk has been ascertained to be the active agent in the propagation of the disease. An important addition to the list has, however,

now been made by the publication of a very valuable report by Dr. Hubert Airy, on an outbreak of scarlatina due to milk at Fallowfield, a village three miles south of Manchester, in the summer of 1879. We take, therefore, the earliest opportunity of laying before our readers the results of Dr. Airy's painstaking researches into the causation of this remarkable epidemic.

It appears that in the last week of July there were, among adults resident in Fallowfield, two or three attacks of illness marked especially by vomiting and diarrhœa, and in one case by sore throat, but not developing the characteristics of scarlatina. On July 31st, there occurred, in a child of one of the same families, a decided case of scarlet fever, which, however, could not be suspected of giving rise to any of the subsequent cases. On Sunday, August 3rd, two children of one family and four children of another family were taken ill with symptoms which soon declared themselves to be those of scarlet fever, accompanied with vomiting and diarrhœa. In the course of Sunday night, August 3rd, and Monday, August 4th, eighteen persons in eleven other families, belonging to or having relation with, though some of them absent from, Fallowfield, sickened in the same way. Several of them had felt their throats sore on Sunday evening. On Tuesday, August 5th, two other cases occurred in two families previously attacked. On Wednesday. August 6th, another family had a slight case of sore throat, which might have been passed over had not two other members of the same family subsequently sickened with scarlet fever, apparently caught from the first by direct contagion on August 9th and 14th. There was also a doubtful case on August 7th, and another on August 13th. Thus, including nine cases of somewhat doubtful or undeveloped character, such as are not unfrequently met with in connection with epidemics of scarlet fever, there were in all thirty-five persons in eighteen families attacked within a period of one month; and of these thirty-five no fewer than twenty-four were attacked within a space of thirty-six hours, between Sunday morning, August 3rd, and Monday morning, August 4th.

The outburst of twenty-four cases of scarlet fever within thirty-six hours pointed to some one common source and act of infection. At once suspicion fell upon the milk; and on inquiry it was found that every family that was attacked had received its supply of milk from one and the same dairy, while neighbouring families, taking milk from other dairies, had entirely escaped. It was further found that one of the milkers employed at this dairy lodged at a house where a boy lay in the peeling stage of scarlet fever; and it was concluded that he had in some way conveyed the contagium of the disease to the milk.

The families supplied from this dairy (D) were between sixty and seventy, scattered over the whole village. With few exceptions, they were families of the better class. Many of them were away from home at the time of the outbreak; others were on the point of leaving, and the date of departure, in some cases, proved to be of critical value in determining the probable date of infection.

It may be said at once that there was not the slightest reason for suspecting any wilful dilution of the milk or want of cleanliness in the vessels. The business was perfectly honest, and there was general testimony to the richness of the milk. The cans were washed out with water laid on to the dairy from the Manchester Waterworks. In this respect this dairy was superior to some others in the district. The cows were about twenty in number, and were, as far as was known, free from disease. The milkers were three in number; (1) the daughter of the farmer's widow who kept the dairy; (2) a young man who lodged in the farmhouse; (3) an old man who lodged at the house of his married son, in a crowded block in the centre of the village. Most of the milking was done by Nos. 1 and 2. There was no definite order of milking; each milker took one cow or another as it might happen, till all were milked. The produce of each cow was poured from the milking-can through a straining cloth into the gathering-can, special care being taken as regards the cleanness of the cloth, and from it, when full, into one of two delivery-cans which were taken round by cart. Thus the first half of the milking was poured into one delivery-can, and the second half into the other. From the morning milking, two carts, each taking one delivery-can, were despatched on two separate rounds, one going to the right (northward), the other to the left (southward); one driven by milker No. 2, and the other by a nephew of milker No. 1, who himself was one of the persons attacked with scarlet fever on August 4th. From the afternoon milking, at 3 p.m., only one cart was despatched, taking two delivery-cans for the whole round. At the bottom of the road, at the end of which the cans diverged, an additional quantity of milk was poured into one or the other of the two D cans from a can (d) belonging to a small dairy at Cheadle Hulme, six miles away. It could not be said whether the northern or the southern can was most likely to receive this addition, but this addition would almost necessarily make some difference in quality (according as the added milk might be more or less pure than that from D) between the northern and southern supplies.

While the bulk of the customers were served by cart, those who resided near the dairy D, were served by hand, the old man (milker No. 3) carrying round their daily supply morning and evening. Thus there was a distinction, as regards the *personnel* of the milk service, between these near customers and the rest; and also (in the morning) between the north and south groups that were served by the two carts. Now, if the fever had been spread by direct personal contagion from one of the milk servers to the customers whom he served, we should have expected to find that spread confined to one or another of the three groups above mentioned. But none of these groups were exempt from the scarlet fever, and we are then driven to the conclusion that the scarlet fever infection was conveyed *in* the milk supplied from the dairy D. Though none of the three groups were exempt from scarlet fever, yet it deserves notice that they were not all equally affected. The families that were personally supplied by milker No. 3 were eleven in number, including the farm D itself, and five of them were attacked with scarlet fever. Of the remaining six, three contained only servants, the families having left on or before July 20th, and in two the families consisted only of adults. In this group, out of six families that were probably susceptible of infection, five were attacked. In the remainder of the north group, there were about twenty-five families supplied by the north cart in the morning. Of these, ten were visited with scarlet fever. Of the remaining fifteen, four families had left, on July 9th, July 18th, July 19th, and August 1st, leaving only servants in the house who took but little milk, and were generally supplied with it in the evening; one family had discontinued taking the milk from D on July 29th; at least six families consisted only of adults. In this

group, out of fourteen susceptible families ten were attacked. The south group numbered about thirty families, of which only two were certainly infected. Of the remainder no precise account can be given; but many had left, and several consisted only of adults. The circumstances of the outbreak conspire to make it probable that the principal date of infection was the morning of Saturday, August 2nd, the disease showing itself in eighteen cases on Monday August 4th, after an incubation of some forty-eight hours, and in six cases on the Sunday, perhaps, after only twenty-four or thirty-six hours' incubation.

As to the manner in which the milk from the dairy D, and especially that portion of it which was delivered to the northern group of customers, should become contaminated with the poison of scarlet fever, it would appear that the contamination must have taken place either (1) in the act of, or after, milking at the dairy D, or (2) in the addition of the supplementary milk from Cheadle Hulme. The facts of the outbreak, however, cleared the Cheadle Hulme milk from suspicion, and brought the inquiry to a point on the dairy D. Early in the outbreak, investigation by two or three medical men in the neighbourhood, who were particularly interested in the matter, brought to light the fact that while at the farm D itself there was no scarlet fever prior to August 4th, and both milkers (Nos. 1 and 2) were free from any evident risk of contamination, the third milker, an old man named Hill, was lodging at a house, in an unwholesome and crowded locality, where his grandchild was lying in the full height of desquamation after scarlet fever. Having regard to the confined space, imperfect ventilation, low standard of cleanliness, and want of sanitary intelligence, it is difficult to believe that the old man Hill could come from that house without carrying about him the taint of scarlatinal infection. It is not at all impossible that he may have carried in his pocket a handkerchief, seldom changed, which had been in contact with, perhaps moistened by the mucus of, the sick child; and at any time his hand may have become accidentally charged with the scarlatinal contagium. What if some such accident happened on the morning of August 2nd, just before Hill took his share of the milking? Might not the taint have passed from his hand to the milk in the very act of milking?—or possibly from his clothing as he grasped the milking can between his knees? There are evidently many possibilities of contamination under such conditions.

How then, on the theory that the milk was thus infected by one of the milkers at the dairy D, could it happen that there should be so great a disparity in the incidence of scarlet fever on the two groups of customers—north and south? It has already been stated that there were two cans filled at the morning milking, which not only received the yield of different cows, but must also have received in different degree the taint (if any) of the milker's hands. It is impossible that the contents of these two cans should be absolutely similar, and in the present case this inequality would in all probability be still further increased by the unequal addition of the Cheadle Hulme milk. It is, then, quite reasonable to suppose that on the morning of Saturday, August 2nd, the two diverging cans of milk were unequally infective, that the one which took a northerly direction was more strongly charged with the infection of scarlet fever than the one which went to the south. This supposition would account for the unequal incidence of the fever on the north and south groups. It must be confessed, however, that there is no positive evidence that the first part of the milking was delivered to the northern, and the last part to the southern group. By the time the inquiry had reached this stage, it became difficult to obtain information.

This then, to sum up, is the theory which appears to offer the most probable explanation of all the facts of this remarkable outbreak; that the milkman Hill did in some way convey the infection of scarlet fever from his sick grandchild at home to the milk with which he was concerned at the dairy D; that while probably on one or two previous days the milk had been contaminated in a less degree, on one special occasion it was especially contaminated; that the contents of the milk can from which the northern group of customers were supplied were on that occasion contaminated in a higher degree than the contents of the other can from which the southern group were served, and that thus there was more general spread of fever among the former than among the latter; that this special contamination probably took place at the morning milking on Saturday, August 2nd, and that the period of incubation, in the majority of cases, was about forty-eight hours.

THE METROPOLITAN SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on January 6, Dr. Bristowe, president, in the chair. After the minutes, a correspondence with the Local Government Board respecting the definition of a 'pauper' was read, in which, after referring to the letter sent by the Society in November, the secretary again pressed for a reply, as, without it, the Medical Officers of Health are unable to come to any conclusion as to the number of beds likely to be required for non-pauper patients. The reply from the Local Government Board was to the effect that the matter was still under consideration, but would soon be determined. Dr. Murphy mentioned for consideration of the meeting Dr. Cameron's Bill respecting animal vaccination, for, although Medical Officers of Health have nothing to do with vaccination, he thought it a matter so materially affecting the public health as to demand the best attention of the Society. Referred to the Council for consideration and report.

Dr. Tripe expressed his regret at the resignation of Dr. Farr, and thought that the Society should take some notice thereof, especially as Dr. Farr had at all times supplied Medical Officers of Health with statistical information not contained in the reports, and rendered every other service in his power. Referred to Council to frame an address.

Dr. J. F. Sykes, B.Sc. (Edin.), of 20, Fitzroy Square, and Mr. J. A. Mackey, B.A., Oxon., Brighton, were balloted for and elected as Associates.

A paper by Dr. J. Tatham, Medical Officer of Health for Salford, was then read by the secretary, 'On certain reforms which appear desirable in the Statistical Reports of Medical Officers of Health'. Dr. Tatham commenced his paper by stating his opinion that whilst the forms adopted by the Society in 1874 were well suited for Metropolitan Officers of Health, yet they required alterations and amendments to make them fit for extra-metropolitan members; and he therefore thought it desirable for the Society to remodel their forms, and then recommend their use by all Officers of Health. He especially dwelt upon the fact that during the past few years there had been a very considerable advance in sani-

tary knowledge and work; but that in consequence of the health records not having been improved, and of the want of uniformity in keeping the statistics of different districts, the results of this work could not be fairly estimated. He had examined the reports of a large number of Officers of Health, and had not found them sufficiently alike to compare even one dozen without making fresh calculations, which occupied so much time as to render the reports almost useless. He thought it difficult to construct a set of tables available for all districts, and therefore proposed that a minimum should be adopted for the larger urban districts, leaving the smaller out of consideration. He had drawn up a set of twelve forms, in which he believed that all the necessary facts and details could be included, and submitted them for the consideration of the Society. He thought that, although somewhat numerous, they are not more than might fairly be expected from a Medical Officer of Health to a large district. The information contained in the various forms was as follows:—The population calculated to the middle of each year, the density of population, total number of births and deaths, the birth and death-rates per 1,000 population, and the proportions of deaths under one year to total births for ten consecutive years. The total mortality for a series of years (say ten) at $\frac{0}{5}$, $\frac{1}{5}$, $\frac{5}{15}$, $\frac{25}{45}$, $\frac{45}{60}$, and above sixty years of age, and the rate of mortality at these groups of ages, to compare with the life table rates at these ages, so as to determine whether the deaths at these ages were above or below the life table rates. The number of deaths at these ages from the diseases included in each of the five groups of diseases adopted in the Registrar-General's reports, the number of deaths at these ages from all the principal causes of death, and the deaths in the different wards or subdivisions of the district from the five groups of diseases. He considered also that other tables should show the number of births and deaths of illegitimate children, for comparison with the births and deaths of legitimate children, the number and proportion of deaths certified by medical practitioners, by coroners, and of uncertified deaths, as well as the average prices of coal and provisions, and the number of paupers receiving relief.

Dr. Tripe said that he had read before the Society some years since a paper on the same subject, in which he pointed out the want of uniformity in the statistical portion of the reports of Medical Officers of Health; but it was then considered premature to take any action in the matter. He had long since given most of the information mentioned in Dr. Tatham's tables, but had adopted the age periods recommended by the Society, and was disinclined to alter them, as his twenty-four years' tables would be useless for comparison. He agreed with Dr. Tatham as to the necessity of comparing deaths at different ages with the life table rates at the same ages, and regretted that the normal death-rate was rarely calculated by medical officers, so that the proper death-rate of a district was not furnished for comparison with the actual death-rate; and that deaths in extraneous hospitals are rarely included in the death returns of the places to which they belonged. Dr. Longstaff said that he had been engaged in a statistical investigation as to the condition of certain districts, but found much difficulty in arriving at a satisfactory conclusion, because (*a*) the increase of population was often ignored; (*b*) the deaths in public institutions were frequently excluded, and more especially because there is an utter want of uniformity in the data included in the tables. He thought that the physical peculiarities of each locality should be mentioned; the elevation above sea level should be given; the kind of water supply stated, whether hard or soft; the average fall of the sewers should be shown, and a return made of the number of water-closets, open privies, or of pail closets. Mr. Humphreys (Registrar-General's office) said that he thought the age periods adopted by the Society are too numerous, and that those given in the weekly returns of the Registrar-General, and recommended by Dr. Tatham, are much preferable. That all deaths should be included in a few groups of diseases, and also that the deaths of males and females should be kept separately, as well as of legitimate and illegitimate children. Dr. Browning believed that if the forms kept by naval officers were adopted, both simplicity and uniformity would be obtained. He also attached much importance to the geology of a locality being stated in a report. Dr. Murphy said that perhaps the matter might be met by a double set of forms being kept by those who had been in office for some years, as after a time the old forms could be dropped. He thought a sub-committee might be selected to consider the matter. The President considered that the paper was too abstruse to be discussed off-hand, and that it would be better for it to go to a Committee. He referred to a paper he had read before the Society on the influence of the birth-rate on the mortality of a district or subdivisions thereof, illustrating Dulwich (in his district) as an example. Dr. Tripe then moved that the Council is empowered to select a committee of seven to consider what alterations, if any, are advisable in the forms adopted by the Society, and to report the same, which was carried. The meeting then adjourned.

BIRMINGHAM AND MIDLAND ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

At the annual meeting of the members of this association, held on January 15, at Birmingham, Dr. May (the hon. secretary) read the report, which stated that the association had now completed its fourth year, and although there had been some falling off in the attendance of members at the meetings, there had been none in the practical value of the subjects brought forward, or in the interest taken in the discussions. There were forty-four names on the list of members, three having resigned, and one having been removed by death—viz., Mr. Dunn, of Hales Owen. Two fresh members had been added. Three meetings had been held during the year. At the annual meeting the president (Dr. Thursfield) gave an address on 'The Attainable Aims of Sanitary Science'; (SANITARY RECORD, Jan. 24, 1879, page 56) and at subsequent meetings papers had been read on 'The Filtration of Water', by Dr. Bostock Hill, and on 'Scarlet Fever Epidemics'. Dr. Thursfield proposed Dr. Fenton as president for the ensuing year. Dr. Wilson seconded the motion, which was carried unanimously. Dr. Bostock Hill and Mr. May were re-appointed treasurer and secretary respectively; and Dr. Fosbroke and Dr. Strange were appointed vice-presidents.

Dr. Thursfield moved, 'That this association is of opinion it is desirable that a general Act of Parliament should now be sought as speedily

as possible, which would enable any sanitary authority to require the notification of cases of infectious disease occurring in its district, without the necessity of its obtaining a local Act containing special clauses as to such notification, as has already been obtained by a number of towns throughout the country. That, in the opinion of this association, it is desirable that each member of this association should bring this resolution under the notice of the authority under which he acts, and urge upon it the advisability of its memorialising the Local Government Board in favour of such an Act; also that the co-operation of other similar associations be sought in bringing this subject under the notice of the Government'. He remarked that at the present time the death return was often the first intimation received by the officer of health of the existence of infectious disease in a house. This clearly seemed beginning at the wrong end. They ought to work up to and not back from the death-rate. Owing to the variable proportionate mortality in infectious disease, death returns were at best most unreliable indications of the amount of such disease, and, besides, the cases which proved fatal had less chance of disseminating the infection than the non-fatal cases. What they wanted was early information of each individual case, and if the result of this should be that attacks of infectious disease in a house should come to be regarded as matters of more importance and of more general interest than at present, it would be so much the better for the interests of the community at large, though in some cases it would doubtless be attended with greater hardship to the individual. It was true some towns had already obtained practicable compulsory powers as to the notification of infectious disease, but the matter should certainly be the subject of a general Act of Parliament, and not, as at present, left to the option of each local authority to frame a suitable clause, and to obtain its insertion in some local Act. What was required was uniformity of procedure throughout the country. Information of infectious disease need by no means lead to inexpedient and officious interference, for all that would be necessary would be for the officer of health to know of the existence of infectious disease, and that all precautions were being taken. There was, to his mind, a special reason why it was incumbent on the Legislature to take action in this matter. There was compulsory attendance at school, and a necessary complement of this compulsory attendance was that, as far as possible, all measures should be taken to ensure that the risk of taking infectious disease at such schools should be removed. He knew too well that amongst the poorer classes many cases of infectious disease ran their course without skilled treatment, and without being recognised as infectious; but this danger might be expected to decrease, and under any circumstances half a loaf was better than no bread.

Mr. May seconded the resolution. He read a letter from Mr. Fosbroke stating that had he been able to have been present he should have supported the resolution; also from Dr. Bond, stating that he should have proposed a modification of it, limiting the powers sought to such authorities as had made proper provision for the isolation of cases of infectious disease. Mr. May said, that at the annual meeting of the Association, held two years ago, it was unanimously affirmed that it should be a legal obligation of the person in charge of the house or case to report cases of infectious disease to the Sanitary Authority; also that it should be a legal obligation upon the medical attendant to give immediate written information concerning the nature of such case to the occupier or person responsible for reporting it, and they need not, therefore, discuss either of these two propositions. The propriety of Sanitary Authorities having the power to require the notification of infectious diseases, had been recognised by Parliament, and at least fourteen towns had obtained that power by clauses in local acts. Eight local bills with such clauses had been proceeded with last Session, and they had passed intact. It appears as though the time had arrived when Parliament should proceed a step farther, and pass a general act of a permissive character, which would enable Sanitary Authorities to require this notification without the trouble, delay, and expense of obtaining a special local act. The Parliamentary Bills Committee of the British Medical Association had unanimously adopted a model clause for insertion in future local acts (drafted by the chairman, Mr. Ernest Hart, to whom medical officers of health are much indebted for the interest he has taken in the matter), and he thought the Association should recommend this clause as the basis of a general act. With regard to the proposition that its powers should be confined to those authorities only which had provided proper means of isolation, be pointed out that even without such means their officers could still advise means of isolation at home, prevent other members of families spreading the disease, restrain parents from sending children to school, secure fumigation, cleansing, and disinfection, remove nuisances from faults of drainage and night soil, improve water-supply, and make enquiry as to the causation of the illness, and for all these necessary sanitary precautions a knowledge of the existence of the case of infectious disease was necessary.

Mr. Perks (Burton-on-Trent) said he represented a district that had already adopted a clause similar to the one suggested. It had been in working order since November 1878, and he could speak as to the practical benefit it conferred. He had been called upon to give evidence of the working of the system at a Committee of the House of Commons, and on that occasion met the first promoters of the scheme, who informed him that the Local Government Board had expressed entire concurrence in it, but at present were not actually prepared to support it. He believed that the efforts of single bodies would receive the direct encouragement of the Local Government Board, as they seemed thoroughly alive to the importance of the scheme, and the time was not far distant when it would be enforced by the authorities —he should think at the passing of the next Public Health Act. It was absolutely impossible, as he had found it, to effectually grapple with infectious diseases without compulsory power.

On the motion of Dr. Alfred Hill, it was agreed to postpone the discussion of the resolution until the next quarterly meeting.

The President then delivered an address on Infantile Mortality, which will be published in the SANITARY RECORD for March 15.

YORKSHIRE ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

A MEETING of the Yorkshire Association of Medical Officers of Health was held on the 29th ult., at the Rotherham Hospital. The chair was occupied by Mr. S. W. North, President, York; and there were

also present Mr. S. W. Wade, Vice-President, Wakefield; Mr. F. W. Barry, M.D., Settle, Secretary; Mr. J. Maude Sutton, M.D., Oldham; Mr. R. Bruce Low, M.D., Helmsley; Mr. H. Butterfield, Bradford; Dr. Hardwicke, F.R.C.S., Rotherham; Mr. G. P. Atkinson, Pontefract; Mr. T. Britton, M.D., Halifax; Mr. W. Saville, Rotherham; Mr. W. H. Barr, Bury; Mr. J. Mitchell Wilson, M.D., Doncaster; and Mr. H. W. Asbucke, M.D., Thorne.—Dr. Parsons, of the Local Government Board, was elected an honorary member of the Association; and Mr. F. H. Wood, Wakefield, and Dr. Hime, Sheffield, were elected ordinary members of the Association.

The President expressed the great pleasure which it gave him and other members of the Association to come to Rotherham, and to make the acquaintance of Dr. Hardwicke. They had been very much interested in looking over the hospital, which was extremely well constructed and fitted for the object for which it was intended. They had also had the opportunity of seeing a system of public slaughter-houses which must commend itself to all for economical purposes, as well as for the manner in which it met all the requirements of the town. They must all be in favour of public slaughter-houses, both on the ground of health and of decency.

The President then read a paper on 'Suggestions for an Inquiry into the Causes of Diarrhœa', which will be published in the SANITARY RECORD of March 15. Dr. Hardwicke, Rotherham, then read a paper on the subject of 'Meat, as Food for Man' (see page 284). The discussion on this paper was postponed. Dr. R. Bruce Low read a paper on 'Remarks on Rural Sanitation', which will also be published in the SANITARY RECORD of March 15.

THE PARKES MUSEUM OF HYGIENE.

FOOD was the subject of the demonstration at this institution on Saturday, Jan. 31st. Dr. G. V. Poore, the lecturer of the day, compared the human body to a machine, and showed that as by a proper consumption of fuel an engine could be made to give off heat, and do work; so the animal body, by a proper consumption of combustible food, was enabled to maintain its proper temperature in all climates, to perform its internal and external work, and likewise (and in this it showed its superiority to the machine with which it had been compared) to maintain its tisssues in a state of health and due development. The composition of the body was next alluded to, and it was claimed for a food:—1. That it must be combustible; and 2. That it must contain materials which were capable of building up the body. The classification of food elements into water, nitrogenous elements, fats, starches, and sugars, and salts, was then reviewed, and the necessity for the presence of each element was insisted upon. Milk—the only single article of diet upon which the human body can be properly nourished—was then shown to contain a due admixture of food elements. In a natural state it had been shown that man might be left to his natural appetites as to the selection of his diet; and many popular foods, such, for example, as bread and cheese, and pork and peas pudding, were thoroughly in accordance with scientific teaching. Some persons were so situated that an obedience to the appetite was impossible; for example, soldiers and prisoners. Scientific dietaries had improved the health of our soldiers, and had converted our prisons from pest-houses into veritable abodes of health. There was still too little science in the feeding of young children; and the ignorance of parents in this respect was truly lamentable. His experience as a physician had taught him that the great majority of children's ailments were traceable to the inability of the mother to make a proper selection of food for her offspring.

NATIONAL HEALTH SOCIETY.

AT the annual meeting of the Society, held at the offices, 44, Berners Street, the report of the year's work was read, showing that sixty-three lectures on simple sanitary subjects had been delivered at working men's clubs, mothers' meetings, etc., during the past year. £120 had been given in prizes for the encouragement of a knowledge of elementary physiology and the laws of health in High Schools and Board Schools.

Playgrounds have been kept open during the summer evenings and Saturday holidays. New sanitary tracts, leaflets, and papers have been published. A series of lectures on the Laws of Health is now in course of delivery at the South London Working Men's Club.

A drawing-room course is to be delivered in the spring. The names of Dr. W. B. Carpenter, Dr. Samuel Wilks, F.R.S., Mr. Ernest Hart, Professor S. Ray Lankester, and Dr. Walter Moxon are among the list of lecturers.

MEDICAL OFFICERS' REPORTS.

BRIGHTON.—Amongst the twenty large towns in England, Brighton had in 1878 to be content with fourth place for healthiness, so far as shown by its death-rate, which was 21.1 per 1,000. The average rate in the municipal borough for the last ten years has been 20.7, so that 1878 was slightly above the average. The increase is accounted for by the larger proportion of deaths of children under one year of age, of persons over sixty, and from diseases of the respiratory organs. Of the total number of 2,203 deaths, 793, or 35.7 per cent., were in children under five years of age, and this number included 531 deaths of infants under one year. The deaths of persons aged 60 and upwards numbered 625, or 28.2 per cent. of the total deaths, and diseases of the respiratory organs 681 deaths, or 20.9 per cent. of the total. Zymotic diseases caused 241 deaths, of which 8 were from scarlatina, 4 from diphtheria, 22 from measles, 82 from whooping-cough, and 109 from diarrhœa. No death from small-pox was registered. During the year 666 connections were made with the main drainage, making a total of 12,710 from the commencement of the drainage scheme, and leaving 5,930 connections to be made. The common lodging houses, bakehouses, slaughterhouses, etc., are favourably reported on.

BURNLEY.—Infant life would seem to be very precarious at Burnley. Of the total number of 1,518 deaths, no less than 878, or 57¾ per cent., were in children under five years of age. Amongst children measles caused 45 deaths, scarlet fever 104, whooping-cough 37, diarrhœa 139, lung diseases 240, teething 104, brain diseases 25, debility 76, and premature birth 65. Dr. Dean makes some very apposite observations on the difficulty of checking such diseases as scarlatina and measles, which are not dreaded,

because they only attack children, who can be replaced. The severe and prolonged cold of last winter is doubtless answerable for the large number of deaths from lung diseases; and the long-contested strike and lock-out in the cotton trade of Burnley is responsible for a considerable share of the increased infant mortality. As to diarrhœa, Dr. Dean thinks the present condition of the subsoil about the 'privy tanks' of the borough is no mean factor in the causation of this complaint. The privy tanks seem to be emptied in a most unsatisfactory and insufficient manner, and they are certainly a very dangerous and unwholesome system of excrement disposal for a town of the pretensions of Burnley. The 'ever-standing smoke nuisance' is reported to be unabated, and the rivers during the dry part of the summer were again offensive. The water supply is wholesome and good, but in some parts of the town it is insufficient. The death-rate for the year was as high as 27¾, but Dr. Dean says he has every confidence that the rate will soon reach its normal level of 25½. Considering the large expenditure of the sanitary department in sewerage, public works, slaughter-houses, etc., Burnley ought by no means to be content with considering 25½ per 1,000 as its normal death-rate, but should not be satisfied till the rate is reduced at least 5 per 1,000.

CROYDON.—In this important and rapidly growing town, the estimated population of which is 67,500, there were 2,314 births and 1,254 deaths in 1878. The death-rate was 18.57 per 1,000, or 0.58 less than that of the average of the last ten years. The number of deaths due to zymotic causes was 196, or rather more than 15½ per cent. of the total. Small-pox and measles showed a marked decrease on the numbers for 1877, and diphtheria and fever a slight decrease, whilst there was an increase in the number of deaths from scarlet fever, and from diarrhœa and whooping-cough the mortality was almost doubled. Of 20 deaths from fever, 18 were referred to typhoid. About the end of August a sudden but limited epidemic of the disease occurred, undoubtedly due to the pollution of a particular milk supply. Fifty-five deaths from diarrhœa occurred in children under one year of age, all of whom, with one exception, were hand-fed infants, and almost exclusively children of the poorer classes. The details given of the preventive measures taken show great energy, though the absence of a proper hospital for infectious diseases seriously militates against their success. The house to house inspection of the cottage dwellings of the district has now been completed, and that of the better class of houses is making good progress.

HANLEY.—Dr. Swift Walker's report for 1878 gives little information as to the sanitary condition of the district, and is mainly confined to an examination of the causes of decease. The total number of deaths was 1,038, against 1,135 in 1877. This gives a death-rate of 22 per 1,000, which is by far too high. The infantile mortality constituted no less than 52 per cent. of the total deaths, and should certainly have been the subject of special comment. Zymotic diseases caused 105 deaths, 62 of these being from diarrhœa and 26 from fever. Absolutely no particulars, however, are given as to the circumstances of any of these cases.

HEBBURN.—The death-rate of this district for 1878 was terribly high, 29.2 per 1,000. As much as 26.2 per cent. of the deaths were of children under one year, and 60 per cent. of children under five years. Only 4 per cent. of the deaths were of persons over sixty years. The death-rate from scarlatina alone (9.3 per 1,000) was little below the rate from all causes in a healthy district, whilst the 102 deaths from this cause represent nearly a third of the total mortality. Scarlatina may be said indeed to be endemic in the district, and whilst the carelessness of parents with reference to it continues to be manifested, and such necessities as a hospital, a mortuary, a disinfecting chamber, etc. are absent, we can hardly hope that it will be stamped out. The extreme prevalence and virulence of the disease in certain streets, whose sanitary condition was unsatisfactory, was a notable feature of the epidemic. The present system of scavenging in the district seems to be peculiarly unsatisfactory, and a committee has been formed to inquire fully into the subject, with a view to its reorganisation. Doubtless the old offensive midden-steads, combined with the proverbial carelessness of colliers as regards hygiene, have greatly helped to raise the death-rate to its present abnormal proportions.

LUTTERWORTH RURAL.—Dr. Elgar Buck's report on this district is very brief, but is sufficient to show that much is being done to improve the sanitary condition of the district. In particular, much improvement has taken place at Lutterworth as regards drainage, sewer flushing, ventilation, and scavenging. Overcrowding seems to be a serious evil, nine cases being reported. The district was singularly free from fatal infectious disease during the year, no deaths occurring from either small-pox, measles, scarlatina, diphtheria, or enteric fever. Several non-fatal cases of the latter and a great many cases of scarlatina are, however, reported. The birth-rate was nearly 27 per 1,000, and the death-rate, from all causes, 18.8 per 1,000.

NORTHAMPTON.—Last year was an unhealthy one for Northampton. The death-rate was 22.7 per 1,000, or 1.9 in excess of that for 1877. This is attributable to the excessive mortality from diarrhœa and whooping-cough, the deaths from these diseases exceeding the number in 1877 by 92. Five per cent. of the deaths were uncertified. The chief feature in the death statistics is the enormous infantile mortality, which hardly seems to have received the attention that it deserves. No less than 364 of the 1,074 deaths were those of children less than a year old, which is equal to a rate of 188.4 per 1,000 births, and forms 34.2 per cent. of the total mortality of the year. Mr. Cogan seems to ascribe the greatest share in this unhappy result to the indiscretion and negligence shown by parents in the treatment of their infants, both in nursery and feeding. The zymotic death-rate was very high (4.6 per 1,000). The chief factors in it were the deaths from measles, whooping-cough, which caused 195, or 89 per cent. of these deaths. Diarrhœa was the most fatal of zymotic diseases, causing 98 deaths, mostly young children. Mr. Cogan's opinion is that although diarrhœa is in a great measure traceable to uncontrollable causes, hygienic imperfections and deficiencies greatly aggravate its fatal effects. Amongst children especially improper feeding is a very frequent exciting cause, for mothers appear to be totally ignorant of the proper mode of nourishing their infants. Scarlet fever caused fourteen deaths, and continued fevers ten. It is noteworthy that of the 219 deaths from zymotic diseases no less than 196 were in children under five years of age. Sanitary work appears to be energetically carried out.

SHREWSBURY.—This is a very able report, and quite sustains Dr. Thursfield's high reputation. A large part of it is taken up with an examination of

the outbreak of enteric fever, already referred to in these columns (vol. ix, p. 278.) During 1878, this disease proved fatal to 20 persons in Shrewsbury, and as many as 250 cases of it occurred. The epidemic was chiefly spread by polluted water from the Severn, and the question of a new and pure supply of water should therefore be at once taken into consideration by the sanitary authority. The present system of sewerage is, moreover, defective and dangerous, and should be immediately remedied. The general death-rate of the town for 1878 was 22.2, or .8 above the average. The death-rate amongst children is still very high, but shows a steady decrease. During the year, 75 deaths occurred from zymotic diseases, equal to a death-rate of 3.0 per 1,000.

SOUTHAMPTON.—Mr. Osborn's report for 1878 shows good work in almost every department. Much, however, remains to do in connecting house drains with the sewers, and furnishing a supply of town water for household purposes. The hospital which has been provided for cases of infectious disease, seems to have been of considerable service, seventeen cases of small-pox, besides two cases of scarlatina, being admitted into it during the year. The general mortality was in excess of that for 1877, the deaths numbering 1,234, as against 1,135 in 1877. The death-rate was 21.16 per 1,000, and that from natural causes 20.47 per 1,000. Zymotic diseases caused 147 deaths, as against 149 in the previous year. Of this number scarlatina is responsible for 23, enteric fever for 10, measles for 27, whooping-cough for 25, and diarrhœa for 47. The number of children dying under one year of age was 263, and from one to five 175. The deaths amongst persons over sixty years of age numbered 307.

UPTON-ON-SEVERN RURAL.—This is a capital little report, showing much energy and care on the part of the Medical Officer of Health, Mr. J. S. Cowley. His remarks on points of general sanitary importance show much thought and considerable practical experience. The principal outbreaks of infectious disease were of scarlatina, which caused eleven deaths in four parishes, and of diphtheria, which has for some years been exceptionally prevalent at a village called Kempsey. Mr. Cowley has not been able quite to make out the causes of this continuous presence of the disease in the parish, though he has evidently given much attention to the matter. Besides these outbreaks, a slight epidemic of measles prevailed in the early part of the year, and diarrhœa frequently occurred in the summer months. The death-rate from all causes was 16.0 per 1,000, or 0.8 higher than that for 1877. The infant mortality was high for a rural district. Much sanitary work still requires to be done here. The nuisance from pigsties, from slaughterhouses, from carriage of privy filth, and from drainage outlets, are all complained of as existing at Upton-on-Severn. The imperfect drainage of the Chase, at Great Malvern, of Powick, Ripple, Carlo Croome, and the pollution of the water supply of several villages, are also referred to, as well as several cases of overcrowding.

WINCHESTER.—The long-wanted drainage of this district is at length on the point of completion, at a cost of £16,300, without any perceptible injury to health from the necessary excavations. The water supply of the city continues to be of excellent quality, but the company, from economical motives, object to provide a constant supply. There was no particular outbreak of infectious disease, except one of scarlatina, which became prevalent in the autumn, and caused twenty-two deaths. The question of providing a hospital for infectious diseases—an institution evidently much wanted—has been brought under the authority's notice, but hitherto nothing has been done in the matter. The erection of a public abattoir seems to deserve early attention. Mr. Langdon's tables are copious, but he offers very few comments on the statistics of the year, which is a mistake. The general death-rate appears, however, to have been 18.1 per 1,000, the parishes on the east of the river showing by far the highest proportion of deaths, amounting in one case to 23.9 per 1,000.

PARLIAMENTARY PROCEEDINGS.

HOUSE OF COMMONS.

(*February* 6.)

THE APPOINTMENT OF CHIEF REGISTRAR.

Mr. Anderson asked the President of the Local Government Board why, in filling the office of Chief Registrar, the forty-two years' services of Dr. Farr were ignored, and the public deprived of his aid in the new census.

Mr. Sclater-Booth said that, owing to the state of Dr. Farr's health, it was deemed inexpedient to appoint him Registrar-General at the time when the vacancy occurred.

Mr. Anderson expressed himself dissatisfied with this answer, and gave notice that he would call attention to the subject.

REVIEW.

A Treatise on Hygiene and Public Health. Edited by ALBERT H. BUCK, M.D. 2 vols. New York: William Wood and Co. London: Sampson Low, and Co. 1879. Pp. 1430.

These two ponderous volumes come before us as part of the American edition of Ziemssen's *Cyclopædia of Practical Medicine.* From a prefatory note of the editors, it appears that in the preparation of the scheme announcing a translation of Ziemssen's *Handbuch der speciellen Pathologie und Therapie*, in 1874, it was thought advisable to omit the first volume of the series, that relating to the subject of public health, since the book, though excellent in other respects, treats the subject almost entirely from a German standpoint. The preparation of the present treatise on private and public hygiene, written by numerous hands with special reference to the different climates, conditions of soil, habitations, modes of life, and laws of the United States, was therefore decided upon. Thus the book is chiefly intended for American readers, and will by them doubtless be thoroughly appreciated. Like all American books, it is very thorough and complete in all matters treated of in it; but the necessary subdivision of the subject into many departments, each of which has been left in the hands of a different writer, has resulted in a great deal of tautology and some important omissions. The idea of the book is thoroughly good; that skilled experts should write papers on the subjects about which they know most is the best possible plan of compiling a satisfactory treatise on any such large subject; the editing, however, requires the greatest care, as it is necessary to avoid the work of one author overlapping that of another, and especially to

see that between the two no subject is overlooked. We could point to several faults of both of these descriptions in the book. The principal error is in the utter inadequacy of the paper on zymotic diseases; the prevention of which is the guiding principle of the science about which the book professes to treat. To know the etiology and predisposing causes of zymotic diseases, and the best means of preventing their growth and spread, is the cardinal principle of sanitary science; and of any of these diseases there is hardly a single word said. In any reissue of the book, a careful study of the subject of epidemiology seems to us to be absolutely requisite. Many of the individual papers are models of study and research. Except the world-renowned Dr. J. S. Billings, however, who contributes a remarkably clever and perspicuous introduction, the names of none of the authors are much known to English readers. The book is divided into four parts. The first, treating of individual hygiene, is arranged under the heads of infant hygiene, food and drink, drinking-water and public water-supplies, physical exercise and the care of the person. The second, on the subject of habitations, treats of soil and water, the atmosphere, and general principles of hospital construction. In the second volume, occupation is discussed under the heads of hygiene, of occupation, of camps, of the Naval and Mercantile Marine, of coal mines, and of metal mines. The subject of public health is divided into infant mortality, vital statistics, adulteration of food, public nuisances, quarantine, inland quarantine, small-pox, and other contagious diseases (an unsatisfactory paper of less than 22 pages), the hygiene of syphilis, disinfectants, village sanitary associations and school hygiene. It will be seen that the scope of the volume is a very wide one, and that, with the important exception to which we have alluded above, very complete. Most of the articles contain excellent bibliographies of the subjects treated of, though some have been collected with more zeal than judgment, insignificant pamphlets of eight pages or so being chronicled as works of reference. There is nothing particularly new to be learnt from the articles; but evidently the greatest pains have been taken with the very large majority of them to make them complete. If, as is the case, English and German authors are very largely drawn upon, it must be remembered that the book is mainly intended for readers on the other side of the Atlantic. It has been, up to within a very recent date, a constant source of lament amongst American sanitarians that they have been absolutely dependent upon us in England for all their knowledge of hygiene. The publication of this work will do much to equalise matters in this respect, for on many of the points the information is most thorough. A work of this description is indeed much wanted in England as well as elsewhere. We have no book that goes so minutely into all the ramifications of hygiene as do the volumes which are the subject of this notice, the facts being scattered over a number of works more or less inaccessible and dear. To bring this pent-up knowledge within the reach of the ordinary sanitary worker is undoubtedly a great step in advance; and as such we may fairly congratulate the editor upon the publication of the book. It remains only to be said that the volumes are admirably printed in clear type on excellent paper, and present in their tasteful binding a very handsome appearance. As a cyclopædia of hygiene and public health, this work is certainly at the present moment without a rival.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

THE METROPOLITAN BOARD OF WORKS AND DISEASED MEAT.

The action of the Metropolitan Board of Works in sanctioning the sale as human food of carcases of animals affected with epizootic pleuro-pneumonia is much to be regretted, and will I feel sure be condemned by the SANITARY RECORD. The error committed does not, however, merit the intemperate abuse which it has called forth in the columns of some of your contemporaries. Doubtless, the Board did not act thus without consulting those considered most competent to advise it; and all whose daily avocations have made it necessary for them to give attention to animal diseases and their influence on the flesh of affected subjects, know how difficult it is to decide what flesh may be safely used as human food.

In the case of pleuro-pneumonia it is especially difficult to say whether its presence justifies rejection of the carcase as food; for if it is epizootic the balance of opinion regards it as rendering the flesh unfit for food, whereas if it is simple pleuro-pneumonia it is not held to prejudice the flesh, and yet it does not appear that there is any reliable way of distinguishing between the simple and epizootic forms of the disease, judging from the ordinary pathological indications presented. Still the Board of Works has been dealing with cases admittedly, or at least presumably epizootic; and in offering for sale as human food meat thus contaminated, or even permitting it to be so offered, an unwise course has been adopted, and more respect paid to the views of veterinary surgeons than medical officers.

There are certainly numerous recorded instances in which local communities have consumed the flesh of beasts affected with this epizootic for comparatively long periods of time, and, so far as is known, without suffering any ill effects, while cases of individuals being prejudicially affected by the ingestion of such meat are rare. But merely negative evidence must not be allowed much weight, for it might be brought forward in abundance, as justifying the admission to the meat market of beef tainted with rinderpest, or swine affected with typhoid fever. Like both these diseases, epizootic pleuro-pneumonia is a malignant contagious fever, and if animals suffering from one such fever are allowed to pass, where is it possible to draw the line?

I feel somewhat strongly on this point, because I have been myself blamed for passing (under certain circumstances) the subjects of foot and mouth disease. Here also is a contagious epizootic, but it is certainly not malignant, and what little fever is first present subsides with the appearance of the eruption. Indeed it is scarcely of the nature of a fever at all, but more nearly allied to simple impetigo or eczema. Similarly I have been blamed for passing (under certain circumstances) the subjects of tuberculosis, yet this is neither a fever nor an epizootic, and attempts to prove that it is contagious have up to the present not been very successful. Obviously the grounds for condemning the subjects of epizootic pleuro-pneumonia are more substantial than any which could be adduced in support of the indiscriminate condemnation of carcases affected with tubercle or foot and mouth disease.

Unfortunately the action of the Metropolitan Board is not without precedent. When the provisions of the Diseases (Animals) Prevention Acts were in force in Dublin in 1877 permission was given to dispose of such of the carcases of the slaughtered animals as should be considered fit for human food; and the veterinary surgeon appointed to inspect animals reported was also empowered to decide whether or not the carcases of those slaughtered on account of the disease were fit for human food. The inspector's opinion in many instances not coinciding with that of the medical officer of health, carcases 'passed' by the veterinary inspector as sound food were seized by the sanitary officers, and destroyed by order of the police magistrates.

Other more recent instances might be cited in which veterinary inspectors have been charged with determining whether or not the carcases of diseased animals are fit food for man, and occasionally what they have passed has subsequently been condemned. I regret to say also that cases are not wanting in which diseased meat passed by the medical officer of one district has been seized, in accordance with the instructions of the medical officer of a neighbouring district. Such unseemly differences between conflicting or contiguous authorities are not calculated to inspire the public with confidence, and it is surely due to the public, no less than to those who serve them in this matter, that steps should be taken for obtaining an authoritative ruling as to what animal diseases are to be regarded as rendering meat unfit for the food of man.

I ventured to suggest some time since that it might be within the functions of the Privy Council to appoint a board of experts to consider this much debated question, and draw up conclusions adapted to guide medical officers and sanitary inspectors in the discharge of their duties; but perhaps you, Sir, or some of your readers may be able to make some more practical proposal. FRANCIS VACHER.

Birkenhead, February 4, 1880.

DISINFECTION BY ACIDS.

In the December number of your journal it is stated, under 'disinfection by acids', that the use of aromatic vinegar acted as a complete preventive to the contagion of the plague of Paris, as testified by four prisoners who had robbed the dead bodies of those who had died from the plague. I shall be glad to know how and in what quantities the aromatic vinegar was used? I am sure anyone giving such valuable information to the public would be conferring a boon they are little aware of. We want more positive evidence than we possess at present as to the prevention of the spread of infectious diseases by disinfectants.

J. ROBERTS-DUDLEY,
Medical Officer of Health for
the Borough of Stalybridge.

[The quantity used is not stated. Our correspondent will find the statement of the fact, which occurred in Marseilles, and not in Paris, at page 9 of Dr. Dougall's paper on 'Disinfection by Acids', published at the office of the British Medical Association, 161, Strand, W.C. In the same pamphlet Mr. Roberts-Dudley will also meet with valuable and detailed information on the whole subject of which it treats.—ED.]

ARE DISEASED ANIMALS FIT FOR FOOD?

At the usual weekly meeting of the Metropolitan Board of Works, held on January 10th last, one of the members—Dr. Brewer—very strongly and vigorously protested against the manner in which the Contagious Diseases, Animals Act, had been and was being carried out. The first part of Dr. Brewer's strictures related to the method of compensating or assessing the compensation for compulsory slaughter; but while this deserves to be studied by the economists on the Board, it has hardly any bearing on the matter I would bring under your notice and comment. The second portion of Dr. Brewer's speech is brimful of sanitary interest, as it relates to the sale of the flesh of condemned—*i.e.*, pleuro-pneumonic—cattle for human consumption. It appears that it is the habit of the Board to sell many, if not most, of the carcases of the beasts they condemn to compulsory slaughter as food. From the speeches of other members it would appear that this practice is approved of on two grounds. Firstly, economy, and secondly 'pity for the poor', who otherwise might be deprived of flesh food.

Dr. Brewer—who was cordially supported in his views by Dr. Ingoldby and Messrs. Runtz, Freeman and Selway—strongly urged the Board to put a stop to this official sale of diseased meat, and called attention to the fact that there were a number of diseases among the people that were concomitant with the existence of pleuro-pneumonia, and quoted an important case where a so-called typhoid-fever case had been traced to the consumption of the flesh of a pig which had been fed on diseased meat.

A Mr. Richardson—who opposed Dr. Brewer's views—said that 'the Board were bound by the decision ot their veterinary officers'. I think the Board in such a question as this should rather consult the opinion of its medical officers.

In connection with this question, I would also call attention to the very numerous convictions which have been recorded during the past few weeks for selling, or attempting to sell, diseased meat. I am inclined to think that, morally as well as legally, the Metropolitan Board of Works ought to have been, on its own confession, placed in the docks to share the justice meted out to these other offenders.

I cannot but think that in disposing of these condemned beasts as food—as Dr. Brewer puts it—'sending their diseased carcases everywhere', the Board of Works have been flagrantly violating the Contagious Diseases (Animals) Act, and has been laying itself open to very heavy penalties, besides, for the sake of a few pounds, endangering the health of its constituents. Perhaps some enterprising ratepayer will raise this point in some court; but while taking advantage of the peculiar action of the Board, as a *raison d'être* for this letter, I would with all the earnestness I can command urge you to use all your influence to get this question of the use of diseased meat as food thoroughly sifted by a Royal Commission. I do so, for the following amongst many other reasons:—

1. At present there is no legal definition as to what renders animal food unfit for human consumption. The Contagious Diseases (Animals) Act orders cattle affected with certain diseases to be slaughtered, and to be buried with lime, etc., as the case may be; but no Act says such and such diseases render the flesh unfit for food. The result is, that the eye alone is the test, and what will pass the eye is allowed to pass into the stomach. From a physiological point of view this is utterly wrong; and my strong personal conviction is, with Drs. Brewer and Ingoldby, that many human diseases are intimately and immediately connected with and derived from diseased meat.

2. Either we are condemning and wasting tons upon tons of meat which might be utilised as food, or we are eating tons upon tons which ought to be condemned and destroyed. Also, we are fining and imprisoning a few persons for doing what others in great numbers do with impunity.

I have before called attention to the various interpretations of which the diseased meat clauses of the Public Health Act admit; and without wishing to palliate the selling of diseased meat, I would now remind you that while the Leicester pie-makers were fined for using tuberculous meat, the existence of tubercle is hardly looked upon by most meat inspectors as of itself sufficient to justify them in seizing the animal affected with it. I take it that tuberculosis is tuberculosis wherever it exists; but as a matter of practice, locality and stage guide the inspectors in their seizures. In addition, so many animals are tuberculous, that were all so afflicted seized and condemned, meat would become one of our rarest luxuries. Phthisis is hereditary in almost all our pedigree stock, and surely, such being the case, it is well worth while carefully to consider whether or no there exists any connection between human and animal phthisis.*

3. It is highly desirable that systematic inspection of our meat supplies should be made, and that all slaughterhouses should be registered. I do not wish to harass the trade, but rather to protect it; and one great step in this direction would be to remove the uncertainty which now exists, as to what does and what does not render meat unfit for food. For instance, 'dropped cows' are almost all consumed as food, and this with the sanction of intelligent veterinary surgeons. By a 'dropped' cow, I understand a cow which has just calved, and then been attacked with puerperal fever. If puerperal fever is the same in cows as in human beings, it is of all fevers one of the most contagious and infectious in all its stages; and the mischief the sale of one such beast might cause incalculable.

4. A fourth reason I would urge in favour of the appointment of a Royal Commission is, that the health and well-being of our flocks and herds is of national importance in a pecuniary light. Absolute soundness is now hardly ever found to be the case in any beast; and, while I would certainly not let sentimental objections interfere with our meat supplies, I think it is certainly high time that some inquiry should be made in the direction I have indicated, when we know as a fact, beyond dispute, that tuberculosis is all prevalent amongst our cattle, that the greatest Local Board in the world condemns cattle wholesale, and then deals in their diseased carcases for the poor's sake; and that, at the present moment, the sheep in our low-lying counties are almost universally rotten. I do not know how many tons of sheep were condemned the other day in one of our courts. If such condemnation was right, thousands of tons are being sold daily which should follow suit.

One result of careful, scientific, and impartial inquiry would be, I think and hope, to improve the health of our herds and flocks. It may be that it will be discovered that zymotic and other diseases in cattle are not communicable, by means of eating, to the human subject. So much the better; but until such facts have been established, the fact that we are eating almost all our diseased cattle, is hardly a pleasant one to contemplate.

In conclusion, let me express my sense of the obligation we are under to Drs. Brewer and Ingoldby, and the other members of the Board of Works, for the courage they showed in thoroughly, but calmly, protesting against the illegal, unfair, and abominable practice in which the Board and its officials have, for so long a time, been indulging.—I am, etc.,

EDMUND J. SYSON,
Medical Officer of Health, St. Neot's, Stamford, etc., Combined Sanitary Districts.

VENTILATION OF ROOMS.

In commenting upon the method of ventilation, given in my letter in your November issue, Mr. Buchan seems to have overlooked the improvements proposed on the original plan. I admit that unless care be taken to keep the spaces between the horizontal bars of the fire-grate free from ash, etc., Councillor Smith's plan *may* be better. In the case referred to in my letter the method was adopted more for the sake of experiment than anything else. I was satisfied, however, that a current of air did pass down the vertical shaft, but did not measure its speed. I cannot admit that Mr. Buchan's experiment conclusively proves the superiority of Councillor Smith's plan over mine. Nor will I admit that my proposed improvements are inferior until sufficient evidence is brought forward to prove the contrary.

W. W. STAINTHORPE, M.D.
Wareham, Dorset, Jan. 24, 1880.

THE HYGIENE OF FOOD.

I read with much pleasure your interesting article upon the above subject, and have tried your hominy and like it as well as porridge, and it is not so fiery. As to oatmeal porridge requiring to be made with 'rough' meal, such as the Edinburgh meal, in order to be 'palatable', or good, I cannot agree with that, as I always considered that the only advantage in porridge making that the rough meal had over the fine meal, as in Aberdeenshire, was that the rough meal helped a lazy, careless servant, etc., to make the porridge more free of knots. I always detested knots in porridge, and have made porridge more than once myself with fine meal to show that with a little care knots were easily prevented. Then, as for making cakes, I consider the rough Edinburgh meal far inferior to the finer Aberdeenshire; while the latter would be better for most stomachs.

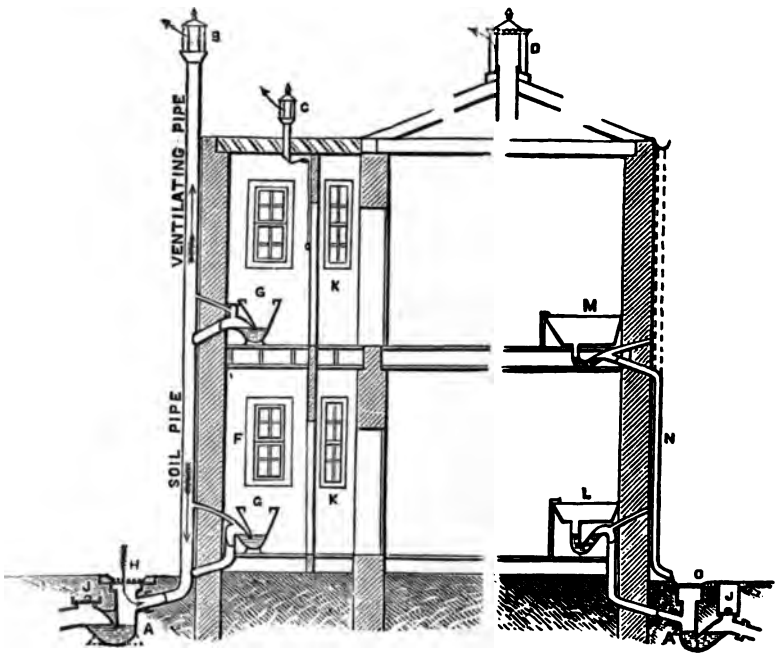
PATERFAMILIAS.

BOYLE'S DOUBLE-ACTION SOIL-PIPE VENTILATOR.

It was a rather curious coincidence to see in your January issue of this year the same mistake that I found fault with Mr. Bailey Denton for committing in 1877—as per diagram on page 276—reproduced by Messrs. Robert Boyle and Son on page 282. The 'No 2' diagram on page 282, which we are told 'shows the system of soil-pipe ventilation which is at present most extensively used by the leading sanitary engineers', is right enough, and combines simplicity with efficiency; but diagram 'No. 1' is simply laughable for its complicated absurdities. It shows a trap, put on at the bottom of the soil-pipe to lock off the drain or sewer air; but any good which this trap (6) might do, is completely stultified by the air-pipe (7) put in from the top of its out-go back into the

* The *London Medical Record* for January 15th, contains a highly interesting article on this subject.—ED. S. R.

ventilating-pipe inside of the house. As to the notion of it being a good plan to blow all the bad air in the soil-pipe outside of the house back into and up through a pipe inside of the house, the idea is both foolish and unscientific. Besides, if the exhaust power of the outlet-ventilator is not a sham, what necessity is there for supplementing it by the use of a downcast-ventilator, and the heating of the upcast-pipe by the atmosphere of the house? In the simple No. 2 diagram, it will be observed that access to the ventilating trap on the house side can be got by means of the fresh air-inlet; but in the complicated and expensive No. 1 style, no means of admission whatever to the trap is shown. Altogether, therefore, I scarcely know whether to class this No. 1 diagram as a practical joke, or as a pure piece of ignorance? As it may be want of knowledge which has caused the mistakes I have referred to, and to help to prevent those mistakes being carried into practice by people who have neither the practical nor theoretical knowledge to judge for themselves, I here give a diagram, showing various styles of fitting up and ventilating soil and waste-pipes, and showing how access can be got easily to both sides of the drain trap, either in hard or soft ground. The traps and ventilators are those advertised by Messrs. J. and M. Craig, and by myself in your own Journal.



W. P. BUCHAN.

21, Renfrew St., Glasgow.

VITAL STATISTICS OF REDDITCH.

In your issue of the 20th October, respecting the recent local census of Redditch urban sanitary district, after noticing that I had repeatedly urged the necessity of such a step (*vide* vol. x, p. 244), it is stated that 'the actual population of the place has been ascertained to be 9,686, or more than 1,000 over the medical officer's calculations'. Such a great difference must make the number of the population appear to be purely hypothetical, and based upon no scientific foundation. As your observation in the above paragraph hardly conveys the true state of the case, allow me to place some points connected therewith before your readers. From the formation of the district to September 29th, 1875, the area of the district did not coincide with that of the parish of Redditch. Its population could not be therefore exactly ascertained from the census returns. Approximately calculated upon the best data it was 7,255 (1871). On the above date the area was enlarged and made to include parts only of four parishes, situated in two counties and two unions (*vide* article, vol. x, p. 244), The census tables were, therefore, again valueless, and nothing short of a local census could avail for statistical purposes. The local authority, on the occasion of making an enquiry respecting the water-supply of the district in October 1875, made a rough computation of the population and found it to be 8,149. After my house-to-house visitation, 1877, I found it 8,630, which I believed to be not much in error on account of the above check, and considerations of the birth and other rates derived therefrom. On June 21st last, the Board, whilst taking a vote of their district in connection with works of drainage, requested the rate-payers to state on an appended form the number of inmates in each house, and so endeavoured to arrive at the population. The following were the results:—Census (night of 21st June) 1879. Number of assessments 2,056. Number of voting papers delivered 2,166. Number of population voluntarily returned 8,556. Number of papers returned blank as to population 226. An average of five persons per house was assumed, and the figure of the population thus arrived at 8,556 + 226 + 5 = 8,556 + 1,130 = 9,686. Duly considering all the difficulties attending an enumeration of a population and the special ones operating in the case of the Redditch district, and having on several occasions expressed my readiness to acquiesce in the results of an authoritative census, I gladly accepted the above figures. I made a retrospective calculation of the chief mortality rates for 1878 on the basis thus afforded, and published the whole of these rates (from January 1878 to the current month) so computed, July 7th, 1879. I now wish to critically examine these data. By retrospective calculations (omitting logarithmic corrections) from the above populations at the above two periods, the population for 1878, which I estimated at 8,630, becomes 9,302, indicating an error of deficiency of 672. My estimated population for 1879 was 8,950, the Board's census estimate 9,686, which gives an error of deficiency of 736, which is not 'more than 1,000 over the calculations'. From the census table 1871, the Local Board's district of Redditch, as distinguished from the parish of Redditch, is shown (division 6, p. 55) to have consisted of 6,135 persons in 1,334 houses, of which 39 were uninhabited. This gives an average of 4.5 persons per house on the total

number of houses, and 4.7 on the number of the inhabited houses. The corresponding dates I obtained from my house-to-house visitation were 4.4 and 4.5 respectively, figures which approximate the average obtained from the national census much more closely than the assumed average of five persons per house, which the Board's estimate adopted. The average per house from the Board's census on the number of assessments is 4.6. From these considerations, it would appear that the Board's estimate is too high. Again, at the national census, 1871, there were 39 void houses in the district; at the time of my inspection 45; no account is taken of the existence of void houses in the local census. Assuming the number to be the same as when I inspected the district, which seems reasonable, it would reduce the figure of the population by 207 on the lower and 225 on the higher estimated average per house. Taking all these considerations into account, that my estimated population shows a deficit of 736 on the assumed correctness of the Board's census, 9,686, and bearing in mind the local difficulties enumerated in your article (vol. x, p. 244), the degree of divergence of my estimated population from truth would, on analysis, seem not to be so great as at first sight apparent. As elimination of some of these defects appear insurmountable, I gladly accept the Board's census population of 9,686, having due regard to the many and great difficulties in estimating and obtaining a scientifically true enumeration of a population in all cases; and the special complications attending the solution of the problem in the case of the Redditch district in particular.

HERBERT PAGE, S.Sc.C. Cantab.,
Medical Officer of Health, Redditch, U.S.D.

NOTICES TO CORRESPONDENTS.

J. A., M.D.—The best work on the subjects on which you require information is *Healthy Houses*, by W. Eassie, C.E. Published by Smith, Elder and Co., 15, Waterloo Place.

SANITARY INVENTIONS.

FOWLER'S PATENT WATER-CLOSETS.

The removal of privy refuse from cottage property has been for some time past a serious question. Amongst other methods recently designed, a means has been devised whereby the most objectionable part of it—viz., the excreta and liquid filth—can be removed from the premises of cottage property by gravitation quickly. This filth, if allowed to remain for a day, is attended with serious results, for as yet little or no profit has been made of it by manufacturing it with manure, and certainly there is no justification for depositing the midden refuse in the neighbourhood of thickly populated towns. No doubt there is some value in this refuse, but such value is principally contained in the urine, where ammonia is present, but the expense of procuring this valuable portion is so great that it is not worth the trouble and expense of getting at it. Liquid sewage cannot conveniently be collected, therefore is allowed to pass off into the sewers. The labour required to remove the refuse; the constant attention required to empty the receptacles or pails, where such are used; the cart hire and storage of the material, very often in the midst of the people, cannot be satisfactory. It is stated that the removal of the refuse alone will cost, taking a very low estimate, not less than 7s. 6d. per ton, and even more than this amount if carted any reasonable distance. The first object to be obtained is to secure the removal of the fæcal matter from the premises as quickly as possible, and so prevent fermentation and generation of foul gases. No doubt the water-closet system accomplishes this in a most complete manner, but the machinery and water-supply necessary for this system cannot be satisfactorily applied to cottage property. There is little question that whenever manual labour is resorted to for collecting the fæcal matter in receptacles and the storage of it in a depôt in or near populated districts, this work is attended with much stench. To cart the material out of the town, the expense to the ratepayers would be very great. The method of collecting excreta in tubs does not obviate the necessity of constructing works for dealing with the liquid sewage which must be passed off into the sewers. Sewage water must be passed off into our rivers, or the sea, so as not to create a nuisance; therefore, sooner or later, throughout the country, extensive works to deal with the sewage of large towns must be resorted to, either by acquiring large tracks of land to utilise the sewage by irrigation, or, in the event of land not being situated at a convenient distance, so as to bring the same within reach, works for deodorising the sewage by means of precipitation will have to be erected. Mr. A. M. Fowler, M. Inst. C.E., Borough Engineer and Surveyor, Newcastle-upon-Tyne, has prepared a design for the construction of water-closets outside houses on such a plan that the use of towns' water and the application of machinery is not necessary. This outside water-closet is formed by fixing a syphon-pan under the seat of the closet, at such a level that the slop and waste water from the sink, bedrooms, and rain water from the roof of the houses, is passed to the slop stone in the yard and is diverted by a covered drain into the syphon pan of the closet, which pan is lengthened from the underside of the seat to suit the level of the drain from a trapped slop-gully in the yard. The advantages claimed are as follows, viz.:—1. The disgusting manual labour of emptying privies or tubs, carting the tubs through the town, and storing the filth in the midst of the inhabitants is dispensed with. 2. Saving in cost of labour in emptying receptacles, cart-hire, rent of depôt, stables, all labour in connection with the storing of filth, and the wear and tear of plant and materials. 3. The stench from time to time arising from the tub or privies near the house will no longer exist. 4. The ashes stored by the system do not create the slightest nuisance, and may be used for works, or making foundations for streets, filling up excavations or otherwise in the town. Garbage tubs may be used. 5. Towns' water is not needed, the refuse water from the house being considerably in excess of that absolutely required or than is usually passed through an ordinary water-closet supplied with towns' water. 6. The closet is always free from smell, sulphuretted hydrogen not being present, as is the case where the fæcal matter is allowed to ferment. 7. That the receptacle for receiving the ashes can be fixed at any height above the floor of the yard, that children may empty the ashes therein, and so prevent the material from being deposited in the yard, as is the case where the hoppers are too high to admit of the ashes being conveniently thrown therein. 8. The principle is self-acting, and cannot possibly get out of order except by wilful design. The Rivers Pollution Commissioners' Report 1870, vol. i, page 25, states, that 'the water-closet is practically the only alternative

plan of house scavenging which is possible under the circumstances of large towns'. At page 48, 'The common privy and ashpit . . . indeed, as already stated in the descriptive part of this report, the privy only professes to receive a portion, and that the least injurious portion of the excreta. The greater part of the urine, and the whole of the fluid refuse from the kitchen and the house generally, is passed directly into the sewer; and as rain finds admission into most of the ashpits, except a few of those more recently constructed, this must act upon the soluble portion of the solid refuse, and carry it into the sewer by the drain, which nearly always connects the ashpits with the sewerage system.' At page 25, 'Utilisation of fœcal matter, which is more easily accomplished under the water-closet than the privy system, the cleanly wholesomeness of the former, and its greater comfort and convenience, are gradually leading to its adoption everywhere in all houses above the rank of a mere cottage; and it is impossible to doubt that as in Liverpool, so in other Lancashire towns, whatever may be the difficulties in its way it will ultimately become the rule.' These opinions are borne out to a great extent by Mr. Baldwin Latham, M. Inst. C.E., and Mr. W. Hardwick, Surveyor to the Local Board, Longton. In that town a large number of Mr. Fowler's closets have been in use four years, and are giving great satisfaction, having been altered from the old privy and ashpit system. The town of Cardiff is fitted up, throughout the cottage property, with pan-closets, also to a large extent in Bristol, which closets have been in use since 1857. In both these towns the waste water is thrown through the seat of the closet. Therefore, there is not so large a quantity of waste water passed through the pan of the closet as by the arrangement patented by Mr. Fowler. Water-closeted towns, so far as we are able to learn, are the most healthy, and will be found more free from the plagues of zymotic diseases than where the midden system is applied. These closets do not require any water beyond the ordinary water passing from the house. It has been said that such closets would be affected by frost in winter and by drought in summer. Since the closets in Longton have been constructed, all conditions of weather have been met with, the two winters having been exceptionally severe, and one summer exceptionally droughty; the closets are not affected by frost or by continued dry weather. All water-closets, where in exposed situations, or not connected with bath apparatus, may be said to have been frozen up during the past winter for a considerable length of time, thereby being of little or no use. The danger of generating disease from such a state of things can easily be imagined.

CALVERT'S CARBOLIC ACID PRODUCTS.

Some recent melancholy additions to the already long list of deaths from misadventure, by drinking carbolic acid, afford a special reason for calling attention to Messrs. Calvert's new form of incorporating this disinfectant into solid blocks. This solidified carbolic acid supplies a want, and places the possibility of danger from this disinfectant entirely out of the question. One of the blocks, which costs one penny, is placed in the closet or utensil to be disinfected or purified, and slowly dissolves, gradually performing its function. It will be evident that there can be no danger of accidental poisoning where these blocks are used; even the most greedy child, intent on finding sweetmeats, would be warned off by the characteristic odour of carbolic acid. Calvert's Carbolised Tow, of which we have also received samples, is now extensively used as a surgical dressing. The Carbolic Soap is found suitable in some forms of skin disease; and the Carbolised Tooth Powder is useful as a disinfecting toilet appendage, where, from various causes, the teeth and breath have any objectionable odour.

DIETETIC NOVELTIES.

TULLOCH'S PURE DUTCH COCOA.

Messrs. William Tulloch and Son, Bury Street, St. Mary Axe, have forwarded to us samples of their Pure Dutch Cocoa, for which they claim the merits of being four times the strength of ordinary cocoa, and of being perfectly free from adulteration. Personal testing enables us to bear witness to the strength of the preparation, a very small quantity sufficing to produce a breakfast cup of finely flavoured cocoa. The nutritious qualities, and moderate cost of this excellent dietetic, should ensure it a conspicuous share of public patronage, as a nutritious breakfast beverage, or a light supper for delicate and elderly persons.

NELSON'S BEEF TEA.

This new candidate for public favour has special merits of its own. Unlike many preparations of the kind, it contains the fibrine of the meat, and thus yields the matters essential to thorough nutrition. It is quickly and easily prepared; put up in most convenient little packages, containing the amount of extract necessary for a breakfast cupful of beef-tea and is nearer to the flavour and aroma of the freshly-made article than any preparation of the kind which has come under our notice.

NELSON'S SOUPS.

We are glad to be able to express a very high opinion of these condensed and dry preparations of meat, and meat with vegetables. All good and sound authors on the subject are agreed that the main defect of the ordinary meat extracts is that they give only those parts of meat which are soluble in water, and that they are thus imperfect as foods, and only of practical value as peptogenic rather than nutritive agents. Nelson's soups are complete representatives of meat; they are highly nutritive, very agreeable, and readily supply excellent and most nourishing soups.

BIRD'S CUSTARD POWDER.

We have the authority of a skilled cook and good housekeeper, as well as the evidence of the palate, that this custard powder makes a rich, well flavoured, and excellent custard. Our cook prefers it to any she has ever used.

'NIGHTCAPS'.

Under this title, hot alcoholic drinks are often recommended as drinks before going to bed. We are glad to say that a wiser authority recommends a tumbler of 'hot Liebig', and of this it may fairly be said that there is not a head-ache in a whole 'ox-head', nor a heart-ache either.

SANITARY JOTTINGS.

Owing to a serious outbreak of measles amongst children, the Woodhouse Street Board School at Leeds, which accommodates 500 scholars, has been closed for ten weeks, and other schools have been disinfected by order of the medical officer of health. Scarlatina is also prevalent amongst children in different parts of the borough. —— At a recent meeting of the City Commissioners of Sewers a letter from H. M. Post Office, stating that serious and continued complaints were being made by their employés of the unwholesome condition of Billingsgate market, was referred to the Sanitary Committee. ——At Leeds, during the month of December last, 1,090 tons 2 cwts. of refuse were disposed of in twenty-four days of twenty-four hours by the process of burning.—— Mr. F. Toplis and Mr. Joseph Lucas have received the silver medal of the Society of Arts for their papers containing suggestions as to the best means of dividing England and Wales into districts for the supply of pure water.—Mr. J. Baynes has been appointed Public Analyst for the Boroughof Boston.—— The Rev. P. Royston, rector of Coates, near Whittlesea, Isle of Ely, states that during the past twelve months, out of a population of nearly fifteen hundred, only eleven deaths had occurred in this parish, and that four of these were infants. It used to be considered that the Fen locality was very unhealthy, but it is now one of the best drained, and consequently most salubrious, districts in England.—— M. Jules Ferry, the French Minister of Public Instruction, has written to the Prefects, ordering them to organise a system of medical inspection for the primary schools, which in some parts of the country are admitted to be very unhealthy, both as regards the buildings themselves and the locality in which they are situated.——Mr. Linnington Ash, Medical Officer of Health for Holsworthy Union, has been elected to the post for the Okehampton Union, the duties to commence at Christmas next, and the salary £3 3s. per report, when called on to make one.——Robert O'Brien Furlong, Esq., M.A., Barrister-at-law, has been appointed Secretary to the Royal Sanitary Commission, Dublin, in the room of W. Jerrold Dixon, Esq., deceased.

The Rev. Henry Stebbings, D.D., F.R.S., Rector of St. Nicholas, Cole Abbey, E.C., has been presented with a handsome silver salver by a number of his friends, in recognition of his long and devoted services as Chaplain to University College Hospital, from the foundation, in 1834, until his retirement in 1879.

Mr. W. G. Grace, the champion cricketer, has been elected recently by the Bristol Board of Guardians as medical officer of the parish of St. Philip. *Fun* remarks that Dr. Grace will probably not remain long at St. Philip, as, though he is a great cricketer, he is not accustomed to 'long-stopping'.

The King of Saxony has just placed at the disposal of the Exhibition Commission an extra special prize, open to all nations, to consist of silver plate, for the best practical scheme for rendering harmless to fish in rivers and lakes the refuse from factories and sewage from towns.

Mr. C. B. Rendle, of Plymouth, has been elected medical officer of their sixth district by the Liskeard Board of Guardians, in consequence of the resignation of Mr. Eastall.

The Home Secretary has replied to representations made to him by a deputation from the Metropolitan Board of Works on the subject of the appropriation of sites for dwellings for the labouring classes, in connection with the Metropolis Street Improvement Act, 1877. The Board asked Mr. Cross to release certain lands appropriated under the Act as sites for these dwellings, and sanction other lands in substitution, and also that he would release the Board from the restriction prohibiting them from taking fifteen houses or more, unless sufficient accommodation has been provided for those who would be displaced. The effect of the reply was that to accede to these propositions would be to render the protection of the Act altogether illusory, and that the practical solution of the question was in pressing on erection of houses for the working classes, who would suffer by the displacement of so many of their number.

Some time since the Académie des Sciences offered a prize of 2,500f. for a method of satisfactorily and permanently silvering mirrors, and which should save the workmen the danger of exposure to the effect of mercurial vapours. The prize has been awarded to M. Lenoir, whose process is substantially as follows: The glass is first silvered by means of tartaric acid and ammoniacal nitrate of silver, and then exposed to the action of a weak solution of double cyanide of mercury and potassium. When the mercurial solution has spread uniformly over the surface, fine zinc dust is powdered over it, which promptly reduces the quicksilver, and permits it to form a white and brilliant silver amalgam, adhering strongly to the glass, and which is affirmed to be free from the yellowish tint of ordinary silvered glass, and not easily affected by sulphurous emanations.

The contract for providing the waterworks of the town of Aldershot with an additional supply of about 100,000 gallons per day of 10 hours, from the chalk springs, has been entrusted to Le Grand and Sutcliff, artesian well engineers, contractors to her Majesty's War Department, Magdala Works, 100, Bunhill Row, London, E.C., and the boring operations have already been commenced.

NOTICES OF MEETINGS.

STATISTICAL SOCIETY.

The next meeting will be held on Tuesday, the 17th inst., at the Society's rooms (King's College entrance, Strand, W.C.), when a paper will be read, 'On Certain Changes in the English Rates of Mortality', by Thomas A. Welton, Esq. The chair will be taken at 7.45 p.m.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting of the Society of Medical Officers of Health will be held at 1, Adam Street, Adelphi, on Friday, February 20th, at 7.30 p.m., when Dr. G. B. Longstaff will read a paper entitled 'Some Facts Bearing on the Etiology of Summer Diarrhœa'. Illustrated by diagrams.

ERRATUM.

Page 176, November 15th, 1879, read, in notice at foot of Dr. Stainthorpe's election: 'Wareham and Isle of Purbeck Rural Authority' instead of 'Swanage'.

ORIGINAL PAPERS.

NOTES ON INDUSTRIAL DWELLINGS.

By ELIJAH HOOLE.

III.—BUILDING MATERIALS.

A BAD workman is said to quarrel with his tools; but even a good workman, if his work be building, might with good reason lament the defects in the materials he is obliged to use. Without referring to the rubbish daily worked up into the smaller houses which are rising on all sides, and occasionally falling, in a similar manner there are inherent defects in almost every building material at its best, which greatly interfere with perfection in building, especially from a sanitary point of view. Our choice of materials is very restricted, since it is obvious that we can only use the plainest and strongest, the most durable, and the least costly, in constructing dwellings for the working class.

The problem which presents itself is by no means easy of solution. A building has to be constructed! strong enough to bear all pressures that can possibly come upon it, either from within or without, it must withstand the forces of frost and sun, of wind and weather, it must be perfectly dry under the most continuous and driving rain, it must stand so firmly on the earth below, as under no circumstances to move a hair's breadth in any direction. It must be so durable as to defy decay, and to require the minimum of repair and renewal, so strong that careless usage will not injure it, so tight that no air can enter it, except through the appointed channels. No part of it, after it is once fixed, must either expand or contract, shake or crack, twist or bend. Above all, the materials must be so selected and put together, that the entire structure will pay a profit on the outlay. And what materials have we with which to secure all these desired ends? Scarcely one which is not subject to injury at the caprice of the tenant, and none which are exempt from decay. There is no such thing as a perfect building material within our reach; many of the best we can afford are exceedingly refractory, and have grave defects, which counterbalance their good points, several that we should gladly use are too costly; and all, with very few exceptions, are engaged in a continued attempt at self-destruction.

So far as foundations are concerned, we have no ground for complaint. Nothing can be better for a building to stand on than a bed of concrete, formed of lime or cement, or gravel. Such a base is practically indestructible, being protected by the ground from frost and fire, and being rather hardened than otherwise by the moisture around it. Strong enough at first to carry the building, it continues to harden for years. It is scarcely needful to add that this excellent method of forming a foundation, though not expensive, is avoided on all possible occasions by the ordinary speculating builder.

For drainage purposes, the pipes, traps, etc., made by Messrs. Doulton, Messrs. Stiff, and others, leave nothing to be desired. Hard, smooth, and well glazed, they are indestructible when once well placed, and are perfectly adapted to the very important purposes they have to serve.

As much cannot be said for the ordinary stock brick, though it has many excellent qualities. It is more durable than many kinds of stone; is unaffected by frost, will bear immense weight, and is in most respects everything a brick should be; but it has a fatal thirst for moisture, and will drink it in whenever it can get it, until perfectly saturated, even drawing it up from the ground many feet into the air. Not only will continued driving rain penetrate a brick wall, unless it be made of considerable thickness, but in warm or dry weather the moisture previously drunk in is given off by evaporation, making the building cold and the air in it damp and noisome. This same defect of porous texture gives the dark and dismal appearance, so striking in many brick buildings in town. The moisture flows in leaving the soot and dust upon the surface, and these cling to the inequalities, and fill up the hollows with grime. Several descriptions of compressed bricks are much heavier and closer in texture than the stock brick, but none are absolutely non-absorbent, unless vitrified or glazed. The Staffordshire blue brick is perfectly non-absorbent, but most dismal in appearance, and far too expensive for one's purpose. A beautiful glazed brick is made by the Fanley Iron Company, and by Messrs. Cliff, which is everything that can be desired; it has a hard texture, a perfect shape, a variety of colour, an absolutely impervious surface, but with the inevitable defect of being far too expensive for use in buildings for the working classes.

But while our ordinary bricks are unsuited for exposure to damp, our cementing materials are excellent. Good lime and clean sand make a strongly adhesive mortar, which, instead of deteriorating will increase in strength by lapse of time. Mortar is often bad because the materials are imperfectly mixed. They should be ground together in a mill, and if a proportion of brick is also ground up with them, the strength of the mortar is increased.

General Scott's invention of Selenitic mortar and cement is a most valuable one, and is especially useful in buildings of the kind now considered, since it sets more quickly and is harder than ordinary mortar, and will take a larger proportion of sand or ground brick than mortar made with ordinary lime. It is especially useful in plastering, being much less easily injured than work done in the ordinary way, and requiring much less time to set. It is manufactured by the Selenitic Cement Company, and is rapidly coming into general use.

But of all cementing materials Portland cement is the most remarkable. A mixture of chalk and clay, burnt in a kiln and ground to powder, it has such power of cohesion and of resisting atmospheric influences, that in combination with sand, gravel, or any hard insoluble material, not only foundations, but walls, floors, ceilings, roofs, pipes, gutters, and indeed any and every part of a building may be formed of it. In practice, however, the use of cement concrete, as a building material, is limited to those localities in which gravel or broken stone can be cheaply procured. In other places, when used for walls, it is more costly than brickwork or local stone. But for paving, for steps and landings, and, above all, for roofing, it is in all neighbourhoods a most valuable aid to the builder of Industrial Dwellings. In the Waterlow Buildings, for example, cement concrete is used for the staircases, the heads to doorways, and window openings, as well as for the roofs and floors. Many streets in London are now paved with artificial stone, in which Portland cement is the cohesive ingredient. Messrs. Allen and Son make an exceedingly durable artificial stone, of which Portland cement is the base, which compares favourably in price with natural stone.

The Silicated stone-paving of Messrs. Hodges

and Buller, of East Greenwich, the stone made by the Patent Victoria Stone Company, and the artificial diamond stone made by Smale and Co. are also worthy of attention. There is hardly anything, either inside a dwelling or outside it, which may not be made of Portland cement. It has but one fault—its colour is hopelessly ugly. When new it has the tint of wet brown paper, varied after a time by a whitish efflorescence which comes out in patches over its surface. When this passes away it gradually blackens in town, and in the country retains much of its originally disagreeable tone. Another way in which it is very useful is in checking the rise of damp in walls, to which allusion has been made. A couple of courses of slates in cement form an effectual barrier to this evil, and there are also several inventions in stoneware which serve the same purpose, notably Doulton's ventilating damp course, which keeps down the damp and, at the same time, ventilates the space under the floor.

One of the builder's main difficulties is with his timber and wood work. Unless he can afford to buy it and keep it for a considerable time, until it is properly seasoned, no wood suitable for building is within his reach. And however carefully seasoned it may be, it first swells from the damp and exposure, and after the completion of the building gradually shrinks, causing cracks in any brickwork resting upon it, and ominous lines of fracture in lath and plaster partitions and ceilings. In dwellings for the industrial class, the use of timber should be reduced to the minimum, both to avoid combustibility and to guard against shrinkage and decay. Wherever the funds at command will admit of the adoption of fireproof or, at any rate, of incombustible construction, it is greatly to be desired.

Iron is another obstinate material; not only does it rust, condense moisture from the air, and stain everything near it, but its uneasy nature never gives it a moment's rest, every change of temperature alters its bulk and, unless its peculiarities are recognised and guarded against, it either destroys itself or the building of which it forms a part. It is, however, most useful in giving additional strength where timber would otherwise be used, as in supporting flat roofs of concrete, and floors of the same material, and in carrying balconies and staircases. In combination with concrete its use is especially advantageous.

Plastering is, of all others, the description of work that anyone interested in Industrial Dwellings would most gladly dispense with. It is so easily and so frequently damaged by the tenants, requires such constant renewal, and looks so patchy after it, that its total abolition would be hailed with delight by those who have to pay for its repairs. Although Selenitic and Portland cements do certainly reduce the evils complained of, they do not altogether abolish them. Nor are they so complete in themselves as not to require the addition of distemper, paint, or wall-covering of some kind, to give a decorative appearance to the apartment in which they are used. Nor, again, are they so absolutely impervious that a room coated with them would not imbibe the seeds of disease in the event of the illness of its inmates. What is really needed is a glazed or vitrified brick or tile of a decorative character and at a low price, with which all internal and external walls could be built or covered once for all, and which could be washed down with a fire engine hose without injury at any time. The present prices of glazed bricks and tiles put them quite beyond our reach for wall-covering, and only permit them to be used in small quantities for decorative purposes.

From the work of the painter, also, deliverance would be a delight. Intended to preserve other work, paint is no sooner completed than it begins itself to fade and deteriorate; marked by every finger, destroyed by every greasy touch, bruised and scratched by the lightest contact with the furniture, it is never perfect for a single day. We have improvements on the ordinary poisonous ingredients of lead, arsenic, and the rest, so fatal to the maker, so pernicious in their effect on the painter, and often to the inhabitant of the poison-coated room. The pigments of the Silicated Paint Company, of the Indestructible Paint Company, of Gay and Co., and of Szerelmey, or some of the zinc and iron paints now made, should supersede the old poisonous compounds, and the use of paint should be restricted within the narrowest limits, it being remembered that a surface once painted must be painted again and again as the paint decays.

Distemper, composed of size, whiting, and a little wholesome colour, is the most healthy covering for a plastered wall, and though easily damaged is readily renewed. The prejudices of tenants often make it needful to paper the walls of rooms. Where there is no escape from this, care should be taken that one paper is not laid on another, and that the colours are not poisonous.

SUGGESTIONS FOR AN INQUIRY INTO THE CAUSES OF DIARRHŒA.*

By S. W. North,

Medical Officer of Health, York; President of the Yorkshire Association of Medical Officers of Health.

At our last meeting a resolution was adopted, appointing a committee to investigate the causes of diarrhœa, more especially that form of it which prevails in the months of July, August, and September —a disease eminently fatal to infant life.

Recognising the many difficulties which beset the inquiry, it occurred to me that it might not be altogether unprofitable were we to discuss the method to be adopted, and determine to some extent the limits of useful inquiry.

As Officers of Health, our chief duty is to ascertain, so far as it may be possible, to what extent any disease is dependent for its origin on causes which admit of removal. Keeping this steadily in view, the line of our investigation will be simplified, and the results of our inquiry more likely to be useful than they would be if we took a wider field.

Diarrhœa is a symptom of varied significance, often an accompaniment of other and grave pathological conditions, not unfrequently the simple result of personal irregularity, or of some excess in food or drink. With this purely symptomatic diarrhœa we have no immediate concern; it can only be prevented by removing the pathological conditions on which it depends, and improved habits on the part of those who suffer by their own error. These causes of diarrhœa set aside, there still remains a serious amount not to be explained by any of them. It is with the cause, or causes of this remaining group of cases that we have chiefly to deal. They occur, for the most part, in an epidemic form, in the later months of summer, constituting the 'summer disease' of some authors, the 'cholera infantum' of others. It is somewhat singular, that whilst the Registrar-General places diarrhœa amongst the

* Read at a meeting of the Yorkshire Association of Medical Officers of Health, held at Rotherham, January 29th, 1880.

zymotic diseases, systematic writers say little or nothing on the question of its origin as a zymotic, nor, so far as I know, is the influence of unsanitary surroundings, as a cause, so clearly insisted on as probably most of us think it ought to be.

It has, to a large extent, been left to officers of health and others engaged in purely sanitary investigations, to insist on filth in its various forms as a prominent cause of this affection. 'Nothing in medicine', says Mr. Simon (*Report of Medical Officer of the Privy Council*, 1858, p. 60), is more certain than the general meaning of high diarrhœal death-rates. The mucous membrane of the intestinal canal is the excreting surface to which nature directs all the accidental putridities which enter us. Whether they have been breathed, or drunk, or eaten, or sucked up into the blood from the surface of foul sores, or directly injected into blood-vessels by the physiological experimenter, there it is that they settle and act. As wine 'gets into the head', so these agents get into the bowels. There, as their universal result, they tend to produce diarrhœa;—simple diarrhœa, in the absence of specific infections; specific diarrhœa, when the ferments of cholera and typhoid fever are in operation. And any such distribution of diarrhœal diseases as has just been noticed, warrants a presumption—indeed, so far as I know, a practical certainty, that in the districts which suffer the high diarrhœal death-rates, the population either breathes or drinks a large amount of putrefying animal refuse. 'A certain quantity of diarrhœa depends, no doubt, on other causes than putrefactive pollution of the system. Phthisis not rarely proves fatal by its effects on the intestinal canal; and probably a few of these deaths are registered under the name of the secondary disease. Temporary faults of diet very often occasion diarrhœa, though not often fatal diarrhœa. Habitually improper food (especially as regards infants and very young children) and various other influences contribute to the total of diarrhœal deaths. But these various causes (so far as they are of personal origin) operate evenly, or almost evenly, throughout the country.' 'And where any of them becomes of local importance, as where, for instance, in certain manufacturing towns, the constant engagement of mothers away from home in various branches of industry, occasions on a great scale the improper feeding of infants, and a consequent excess of fatal infantile diarrhœa; this influence, like that of the filthiness first spoken of, is of an unnatural and removable kind, of a kind against which local arrangements ought, directly or indirectly, to provide.'

Dr. Greenhow's admirable report on the Diarrhœal Districts of England fully justifies the statement that at the time when the investigation was made, there were districts characterised by excessive mortality from diarrhœa, and others in which the disease scarcely figured as a prominent cause of death. That even within limited areas, there were districts presenting the same variation in the proportion of deaths from this disease; and that, wherever a high diarrhœal death-rate prevailed, the area, whether large or small, had one common character, neglect of cleanliness.

After a lapse of more than twenty years there still exist districts characterised by a high diarrhœal death-rate, and others distinguished by their comparative freedom from diarrhœa as a cause of death. Can we now say that the diarrhœal districts are essentially filthy districts? A careful inquiry as to the truth or otherwise of this single fact over the area of Yorkshire would go far to establish or refute the opinion that summer diarrhœa is essentially a filth disease. If it is, we have only to map out the districts where a high diarrhœal death-rate prevails, search for the filthiness and have it removed, to secure a large diminution in the death-rate of the district.

There is yet another question of the highest importance, and which must be determined before we can arrive at accurate conclusions, and before we can with certainty compare the diarrhœal death-rate of one district with another. Has this summer diarrhœa, as a filth disease (if it be so), any specific characters by which it may be distinguished from purely symptomatic diarrhœa, and from those cases which are dependent on errors of diet? Or, to put the case otherwise, given a case of diarrhœa where there is no organic lesion and no palpable error of diet to account for its occurrence, are we to assume that it owes its origin to filth or the absorption of decomposing organic matter? Lebert (Ziemssen's *Cyclopœdia*, vol. i, p. 343), describing the disease under the name 'Cholera Nostras, Europœa', says, 'When we remember that fluid and solid ingesta act far more injuriously according to quality than quantity, the question arises whether there is not a septic element at work as a causative agent of great importance, and whether the chief difference between cholera nostras and Indica does not consist in the fact that our cholera depends more upon the parasites of common decomposition or putrefaction, while the Indian form is due to a foreign, specific, originally imported, but now acclimated germ, which always produces the same specific form of the disease. That cholera nostras does stand in connection with the products of decomposition and septic elements, and that even putrid exhalations may excite it, is proved by well-known examples.'

If this cholera nostras owns a septic origin, has it any characteristics by which it may be distinguished from the various forms of diarrhœa which are to be met with at all seasons of the year? Is there in this country a form of diarrhœa characterised by sudden invasion, by profuse watery discharges, by general collapse, running a rapid course, to be distinguished from the irritative form characterised by pain, frequent scanty evacuations, readily assuming a dysenteric character, never speedily fatal, but pursuing a more or less protracted course? Or are the two but different aspects of one and the same disease? Is there in fact, a true cholera nostras of Lebert—cholera infantum of American authors? If there is, under what circumstances is it chiefly found to prevail? Is it the disease with which we, as Sanitary Officers, have mainly to deal?

This first and all important question can only be determined by a record, on a large scale, of cases observed, without bias, in districts of varying character, and amongst populations living under different conditions.

Our first inquiry, then, should be what are the prevailing characteristics of the diarrhœa of any given district? The best answer to this question would be carefully prepared groups of cases from different localities within the same district, and from different sections and classes of the same population. These, if sufficiently numerous and carefully reported, would give the committee the facts on which to form an opinion whether in their further investigation they had to deal with a diarrhœa having specific characters, or whether they must be content with the term diarrhœa for all cases without any means of distinguishing the different forms of the disease.

In their very admirable report on the prevailing

diarrhœa of Leicester, Messrs. Buck and Franklin show that a very large proportion of the cases investigated had the choleraic type. This is no more than we should expect if the disease owns a septic origin. Isolated cases associated with unwholesome surroundings in otherwise healthy districts should be carefully observed and accurately reported. They are of the highest value in an enquiry of this kind. Such cases occur in the best parts of all towns, and would well repay investigation.

Having got our cases in sufficient number fully reported, the next series of questions would have reference to the character of the people, their occupation, habits, etc. These should be followed by detailed questions referring to the sanitary condition of the house, yard, street, etc. Their freedom or otherwise from the products of excremental and other decomposition. The condition of the soil below and about the premises, its freedom or otherwise from the like pollution—in yards and streets made the receptacle for household slops, the sub-soil can never be free from this kind of filth. In this inquiry, the condition of the sewers is of great importance; drainage, however good, has introduced new modes of pollution. Is the sub-soil free from pollution by exudation from stagnant or imperfect sewers, a common cause of pollution of the soil and its contained air, and none the less important because it is out of sight. Is the sub-soil dry; if not, in towns and the vicinity of houses, sooner or later it becomes polluted by soakage from the surface.

In the report I have previously quoted on the diarrhœa of Leicester, the authors come to the conclusion that a water-logged soil rendered filthy by soakage from ill-constructed or ill-contrived sewers, had much to do with the causation of the disease in that town.

A further and important branch of the inquiry should embrace the question of food and the mode of feeding. Are all the victims of diarrhœa hand-fed children, or have children so fed the preponderance in the death-roll? Within my own experience, all the children of the very poor, and the great majority of those of the artizan class are more or less hand-fed from a very early period; nevertheless, large numbers live and thrive. We should not, therefore, conclude too hastily that hand-feeding is the sole, or even the most important element in the causation of diarrhœa. The quality, and above all, the soundness of the food is of far more importance than the mere fact that children are hand-fed. Nevertheless, the mode of feeding should be noted, as well as its kind and quality. To elucidate this point, careful inquiry should be made as to the wholesomeness of the food used, and its freedom, or otherwise, from decomposition. Milk, and other articles of infant diet, kept exposed to foul emanations from humanity, can scarcely long be free from decomposition. There should be no difficulty in ascertaining how far this is a factor in producing the disease. As but little care is taken in this respect by the very poor, I suspect it is by no means the sole or most active cause, however much it may render those who use it susceptible of specific infection.

Bad air, and filthy sub-soil, is probably characteristic of all or nearly all the districts of towns in which the very poor reside, these conditions being generally associated with depraved habits and the use of improper food. We can only hope to determine which of these is the most important factor, by a process of exclusion. By studying groups of people, amongst which only one or two of these conditions prevail, we may hope to arrive at the specific significance of each.

There is yet another branch of the inquiry of the utmost importance, and one which must be carefully studied before we can arrive at any definite conclusion as to the cause of epidemic diarrhœa. I mean the extent to which it prevails amongst the adult population. From the fact that the chief mortality caused by this disease occurs in young children, it is too much regarded as a disease of early life, and for this reason more importance is attached to the question of diet than it deserves. A moment's reflection will show that if the disease is equally prevalent amongst people of all ages, though only fatal early and late in life, its cause lies, to a great extent, outside the question of diet. No doubt, persons of all ages, whose digestive system is disordered by habitual errors in diet, are more liable to diarrhœal diseases than those who live under more favourable circumstances.

Assuming the fact that diarrhœa, having specific characters, prevails at certain times of the year amongst persons of all ages in any given district, it seems more likely to owe its existence to the character of the district, and to local circumstances, than to the personal habits of the sufferer. Is filth, in some form or other, the one factor common to the population? Such was the conclusion arrived at by Dr. Greenhow, after an exhaustive inquiry, made more than twenty years ago. He says, 'however great the influence of season, of age, or of the mismanagement of young children, in causing a large mortality from diarrhœa, the concurrence at least of some other cause might be expected from the very different rate of mortality which prevails in different districts. The present inquiry has very clearly established the existence of two principal local causes of this disease. These are the breathing an atmosphere tainted with the products of animal decomposition, more especially, although perhaps not exclusively, that of human excrement, and the drinking of impure water. Wherever a well-marked local excess of diarrhœal mortality was found, it always occurred in connection with one or other of these two circumstances; and, generally, as nearly as could be estimated in exact proportion to the prevalence of the supposed cause.' Is such our experience? If the result of our inquiry goes no farther than to establish or refute this opinion, it will have a high value.

In brief, then, our inquiry should be so defined as to secure groups of facts which will enable us to answer the following questions:—Is there, or is there not, a specific form of the disease? is it equally prevalent at all ages? is the area of its incidence characterised by filth, pollution of the air, and the sub-soil? Subordinate, but all important, the diet and mode of living of those who are attacked, and the distinctive conditions, if any, in these particulars of those who escape.

Such, in outline, is the direction in which it seems to me an inquiry into the causes of diarrhœa would be most likely to lead to profitable results. It has been said that these diarrhœal disorders constitute but one group of the many forms in which impaired nutrition leads to death; that they have no specific character, and own no specific origin, and that their cause is to be found in the depraved habits, and generally unwholesome surroundings of certain sections of the community; a high temperature acting on the nervous system, determining the character of the disease. This seems scarcely a scientific expla-

nation, and does not embrace all the known facts. Recent investigation conclusively shows the importance of low forms of organic life as a cause of putrefaction, and that these forms are most abundant in an impure atmosphere, that certain conditions of temperature and moisture favour their production, that these are the conditions under which we find the greatest prevalence of diarrhœa. It may be, and probably is quite impossible to determine with accuracy the specific character of the agent which produces this disease; but surely through the wide area of Yorkshire, with its varying urban and rural populations, by the aid of our members scattered through every part of the county, we may be able, as a result of this inquiry, to determine, with some approach to accuracy, the character of the localities in which the disease is known to prevail. To this end we ask the cordial assistance of every member of the Association.

It will be the duty of the committee, in their report, to indicate the more important meteorological conditions, the density of the populations dealt with, their average death-rate, and such other local circumstances as may seem to throw light on the subject. The committee will not hesitate to avail themselves of the assistance of persons outside the Association, who may have special knowledge of the subject, or who may be willing to favour them with suggestions, copies of reports, and other information.

INFANTILE MORTALITY.*

By Mark Anthony Fenton, M.D.,
Diplomate in State Medicine, etc., etc.,
President Birmingham and Midland Association of Medical Officers of Health; Medical Officer of Health, Coventry Urban District.

The subject of infantile mortality is one of such an extensive nature, and depends upon such a variety and complexity of causes, that it would require volumes to exhaust it, or even do it justice. It is, therefore, impossible in a paper like the present to do more than take a general view of it (more especially as to the preventable mortality), and to indicate a few remedial measures, by which it appears to me capable of reduction.

The excessive fatality amongst infants now taking place throughout the kingdom is one of the most important matters with which the political economist or medical officer of health has to deal; for I think we may say that so far it remains untouched. Unfortunately, its importance is only equalled by the difficulties lying in the way of reducing it to more moderate proportions. The rate of infantile mortality may be taken as a fair measure of the hygienic and moral conditions under which any population exists; and perhaps from this circumstance the subject derives its greatest importance. For, if we would deal with it, we must not only deal with every evil influence which operates in increasing the general rate of sickness and death, but we must also attack several social evils existing in the daily life and homes of the people, especially the working classes, for it is only by improving their condition, both physically and morally, we may hope to accomplish our object. In order to estimate the extensive nature of the question, it is only necessary to consult the statistical facts recorded by the Registrar-General, and to observe the enormous proportion of children dying during the first year of life, and the excess of those proportions in certain districts, and classes of society. The number of deaths taking place annually in England and Wales, is about 500,000, and of these about 120,000, or one-fourth of the whole, are infants, that being about one-sixth of the total number of infants born during the year. Mr. Simon, who must be regarded as an authority in such matters, has asserted that one-third of the mortality of this country might be prevented by an intelligent application of our knowledge of the causation of disease. If this be true of the general mortality, it is even more so of that of infants. Applying this rule, we would appear to lose about 40,000 infants' lives annually, that might be preserved to maturity.

This fact alone should endow the question with sufficient gravity to bring it not only under our consideration, but also that of the Legislature. Indeed, this annual loss becomes a source of weakness to the country at large, in these days when international struggles for supremacy rage so fiercely, when the voice of a country in the councils of the world is estimated by the number of hundreds of thousands of fighting men who can be placed in the field to sustain it.

How far the present mortality is excessive, and to what extent it is capable of reduction, are, perhaps the first points which should be determined. Both questions are difficult to answer accurately, or even approximately; but there cannot be a doubt as to the fact that it is largely excessive. We find ample proof of this in the death-register. The infantile death-rate for England amounts to about 150 per 1,000 of all born; but this rate is made up of such wide variations as the following:—In healthy districts, 103; in London, 155; in seventeen large towns, 193; in Leicester, 200; Liverpool, 250. In London, even wider variations than these have been observed, the rate depending, as it does in all districts, upon the class of its inhabitants. In Mayfair it only amounts to 99; while, in St. Olave's, it reaches as high as 360. In connection with the rates of infantile mortality in the different grades of the community, Mr. Charles Ancell has made some instructive inquiries, which show plainly the immense waste of life taking place in the lower classes. Amongst the well-to-do people he has found it to be about 80 per 1,000 born; going down the social scale it increases, until it reaches a rate of from 300 to 400, amongst the illegitimate infants of certain towns where his enquiries were instituted. We therefore appear to lose about 10 per cent. of the infants born in healthy districts; while, in many large towns, from 20 to 40 per cent. are sacrificed to the many evil influences which are brought to bear upon them. Such figures, I think, require but little comment, and should be sufficient in themselves to carry conviction to the minds of any one as to the excessive nature of the mortality. What, then, are the causes which contribute to these results? First, the increasing tendency of the population to congregate in large towns, and the conditions resulting from that congregation if left unchecked; for I do not consider a high rate as necessarily associated with urban existence. Still, the greatest excess takes place in the large manufacturing urban populations, and the mortality is lowest in the more primitive rural districts. Many of the artificial conditions arising from what we consider to be our advanced state of civilisation, especially in urban life, are extremely injurious to the young; and, unfortunately, the infant, upon its part, is not endowed with any increasing vitality to resist these destructive influences; on the contrary, the more highly organised and refined the species of animal life which we

* Read at the annual meeting of the Birmingham and Midland Association of Medical Officers of Health Jan. 15, 1880.

study, the more delicate and susceptible to evil appear the offspring, and the more difficult to bring to maturity.

This inherent delicacy would of course affect both urban and rural life, but in the country there are few of those aggravating conditions which arise in densely populated districts, and render life at all ages more precarious, where the atmosphere is fouled from a host of filth collections, from sewer gases, from overcrowding of houses, and where milk, if not wholly discarded as a food for infants, is only attainable diluted, and frequently polluted, with water. These, however, are the ordinary unhealthy conditions with which we all are only too well acquainted; it is therefore unnecessary to enter into their consideration. Not that I would under-estimate their importance, but I believe strongly that the largest amount of preventable fatality is due to certain social evils arising from the manner in which domestic matters are conducted amongst the lower classes, and with those we are more especially concerned.

The most grave and wide-spread evil is the desertion by the mother of her legitimate sphere in the household in order that she may assist in augmenting the family earnings. The constant and careful attention required by the infant and young children, together with the other duties of the house, certainly require the whole time of the mother, but if she abandon them, or delegate them to aged and incompetent persons, the weaker members of the family are sure to suffer. Here we have the vexed question of factory employment by married women brought under notice, and my experience would lead me strongly to support those who assign to this employment the first importance as a factor in the production of a high infantile mortality-rate. Although the inquiries which have hitherto been made upon the subject in Leicester and other towns have gone to show that the children of the working mothers did not suffer more than others, I believe that those results are misleading, for the inquiries were only directed to ascertain whether the mother went out to work at a factory, whereas in my experience almost as great a proportion of married women are engaged in various branches of trade at home as go out to work in the factory, and the infant is even more neglected in these cases, for there is no limit to the number of hours which the mother may devote to work away from the child.

The evils arising from the mother abandoning her natural position in the household are exceedingly numerous. As regards the infant, the most fatal is the necessity for artificial feeding. This weaning of the baby at a tender age is often of itself destructive, and it is unfortunately often made so by the unsuitable character of the substituted food, which is generally entirely farinaceous in its nature. We know, however, that starch food requires a much more highly developed digestive apparatus for its digestion than is possessed by the newly-born infant. The pancreatic fluid, which plays an important part in the conversion of starch into sugar, and so preparing it for assimilation, is very limited, and so the food passes away undigested, or gets into the system in a form unsuited for the supply of its requirements. We have consequently resulting a class of diseases forming a prominent feature in our death returns, such as wasting, marasmus, atrophy, debility, natural weakness, diarrhœa, rickets.

Here I may be allowed in passing to enter a protest against the use of some of these terms as indefinite in describing the cause of death. The medical attendant should be sufficiently specific in his diagnosis to state the disease, and not a symptom or a meaningless name, as we frequently find to be the case.

There is a strong prejudice in the minds of ignorant persons against the use of milk and other light animal food for their infants, which I have frequently found impossible to overcome. The food is not only unsuitable, but it is imperfectly prepared in the absence of the mother, or perhaps a stock is prepared by her before leaving home, which soon becomes sour and unwholesome. Generally, too, the infant is allowed to suck its food continuously from that wretched apparatus the feeding bottle, and so the stomach is constantly loaded with indigestible food.

In connection with the trade employment of mothers I often find the practice of giving opiates. If the mother works at home she administers narcotics so that she may pursue her work undisturbed, or going out to work she commits the infant to some incompetent person at home, or deposits it at a day nursery, where it is not only drugged, but also subject to other evils. I had a census taken recently of the day nurseries in my own district, with the result of finding them to be wholesale propagators of disease. Forty establishments of this nature were found, with an average attendance of 1000 children under 3 years, a large proportion being infants. All were kept by incompetent persons; in very few instances were the houses or the situations fit for the purpose, while overcrowding existed in many to such an extent that there were only 30 cubic feet of air for each child. Children were discovered in these nurseries suffering from various forms of zymotic disease, including scarlet fever, measles, and whooping-cough, without the slightest attempt at isolation.

There are many other avoidable causes acting in the production of infantile diseases, independent, however, of the absence of the mother from home. The most powerful of these is the ignorance displayed by the lower class mother in the management of her children, especially as to diet. In illustration of this I will mention two instances out of a large number coming under my observation. I was requested to see a child early one morning, recently, aged nine months, suffering from convulsions. On inquiry I discovered that although the child was breast fed it was also allowed to eat the same food as that taken by the family generally, and that it had on the previous night a supper consisting of sausages and porter. The second case was that of a child only three months old, fed in a similar manner, inclusive of a wine-glass of porter daily. It was affected with a pustular eruption over the body and head. These are, I believe, the common experiences of every practitioner coming in contact with the working class matron, and the latter usually refers with pride to the heartiness and rude health of her offspring as evinced by these voracious performances.

Turning for a moment from the consideration of the cause to the effect, let us examine the headings under which the greatest number of infantile deaths are registered. About one-half the total, or 60,000 per annum, are certified as taking place from diarrhœa, convulsions, atrophy, or debility; about 20,000 from diseases of the respiratory organs, and 8,000 to 10,000 under the term violent deaths.

On reference to this category it will be seen how large a proportion of deaths result from the wasting diseases, probably of dietetic origin, already spoken of.

Under the same heading there is the all-important subject of diarrhœa, from which cause alone over 20,000 children die annually. This disease is certainly the great antagonist with which the infant has to struggle in urban life, and without it many of those towns now remarkable for their Herodian results would cease to be conspicuous in this respect. The subject is one upon which so much has been said and written already, that every conceivable theory concerning it has its champion. Nevertheless, there is no real consensus of opinion as to its true cause, whether high temperature alone is sufficient to induce it in an epidemic form, or, if not, what additional conditions are required. Does it depend on zymotic or fermentive processes, upon the changes produced by decomposition, upon improper feeding, impure air or water, or, finally, how far is it effected by the trade employment of the mothers is still a matter of doubt. That a high temperature (probably a mean of about 60° or over) is of primary importance in its development appears to be the only point generally agreed upon; and of this we have had ample demonstration during occasional cold summers, especially last year. But it is equally evident that other conditions are necessary to account for the difference in the diarrhœa rate in towns having the same temperature, and also in the higher and lower classes in the same districts. That they depend upon any so-called zymotic action producing a specific germ or medium capable of disseminating the disease, I have had no proof of, nor do I believe that it should be placed under the heading of zymotic diseases at all. My experience would lead me to the conclusion that the disease is produced in by far the great majority of cases by some filthy conditions associated with the well-known tendency to congestion and derangement of the gastro-intestinal tract in hot weather, and the sympathy between the latter and the functions of the skin, which are apt to be disturbed from the same cause. In using the term filth, I would give it its widest meaning, including the pollution of the atmosphere, of the water, the want of attention to the personal cleanliness of the infant, and, more important than all, the impurities and changes produced by decomposition in the food, so rapidly produced by the high temperature. Whatever promotes these conditions will increase the diarrhœa rate; and here I think it is that the trade employment of the mother is so intimately connected with its causation, for during her absence at work the infant and household generally suffer in this respect.

The history of the diarrhœa fatality in Coventry affords so striking a proof of its connection with the trade employment of mothers, that it is worthy of mention. During the ten years ending 1859, female labour was in great demand, owing to the prosperous state of the ribbon trade at that time. The diarrhœa fatality amounted to an average of 3.5 per cent. of the total births for each year. In the year 1861 a commercial treaty was concluded with France, which gave the French traders such advantages, that the Coventry manufacturers were beaten out of the market; and for the following ten years there was but little employment for women. The diarrhœa rate in 1860 dropped to .25 per cent. of the births, and for the ten years ending 1869 only amounted to one per cent.

Even in 1868, a hot summer, when nearly every town suffered severely, the Coventry rate was less than 2 per cent. of the births. In 1870, the importation of silk goods from France was stopped, owing to the war. This trade consequently revived; every available hand in Coventry was set to work to supply the French deficiency. The diarrhœa rate for that autumn went up to 5 per cent; although it had never been higher than 2 per cent. since the year 1859; yet the year 1870 was not remarkable for a high diarrhœa rate generally throughout the country. With unparalleled rapidity the French people returned to their former position in commerce and manufacture, and as quickly did the Coventry trade again fall off, and the diarrhœa rate dropped down to less than 10 per cent., the average for the following nine years being .95 per cent. of the total births for each year. I have carefully inquired for any other changes in the district which might contribute to these results, but I have failed to discover any that would satisfactorily explain such striking coincidences. It must be borne in mind that the trade alluded to is one in which female labour is largely employed.

There is another class of mortality requiring some consideration, almost entirely preventable, registered under the heading, violent deaths, and principally arising from negligence and criminal design; these latter causes account, to a great extent, for the enormous fatality taking place amongst illegitimate infants. This class of life has its enemies from its earliest conception. If the fœtus is allowed to reach maturity, it is often destroyed, or allowed to die by its mother, the midwife, or nurse, or, surviving these dangers, it is committed to the tender mercies of the baby-farmer where it usually succumbs to ill-treatment, drugging, and starvation. Here our present code of laws fails miserably. Infanticide by the mother is looked upon lightly, and dealt with accordingly; while the baby-farming act, passed especially to protect this class of life, has so signally failed, that in the metropolitan districts it is stated, on good authority, that 80 per cent. of the illegitimate infants farmed out die. Another wide door is opened for the commission of crime, and destruction of infant life, by the custom of registering uncertified deaths. If the child is said to have died without medical attendance, it is usually registered uncertified, unless some suspicious circumstance should happen to come to light; and this is not unfrequently done with deaths of children, and even adults; while it is only necessary for the mother, or some relative, to state that a child was still-born, to avoid altogether the necessity for registration.

Lastly comes the most important question of all, as to how this grievous list of unnecessary suffering is to be diminished or prevented. The first remedy suggested by most sanitarians is sanitary education. It would, however, be necessary to educate parents, not only as to the proper care and diet required for their children, but also to educate them into a proper appreciation of the moral responsibilities devolving upon them towards their offspring. This process would be extremely slow, and our experience of any attempt to educate the working classes in sanitary matters is extremely unpromising. The suggestion to prohibit the employment of married women in trade would, I think, only increase the evil, as it would increase the poverty and want, and there would still be the evils arising from ignorance.

It would be better for the State to interfere, and take charge of the infants during the working hours,

by means of the *crèche* system, and this I believe to be the only true remedy. The evidence obtained from the Continental experience of the system, goes strongly to prove that wherever it is adopted to a sufficient extent, it has a most decided effect in reducing the rate of mortality.* In Belgium, where it is extensively carried out, the infantile mortality is low. In Brussels, the *crèche* and infant schools are combined, so that the child is kept under state supervision until four or five years old. In Paris, too, the *crèche* system has been worked to a considerable extent, and, I am informed, with excellent results. One fact related by those in charge of these institutions in Paris should, of itself, be sufficient to induce a trial of it in England, that is, that epidemic diarrhœa is unknown in the *crèches*, notwithstanding the high temperature to which they are exposed. At Milan, after an experience of twenty years, with over 10,000 infants, those in authority form a most favourable opinion of this institution, the mortality amongst the infants sent to the *crèches* being only half that of the infants not subjected to the same treatment.

Equally beneficial results have been obtained in other European cities where the system has been tried. The establishment of the *crèche*, to be of use, should be universal and compulsory, so far as the working classes are concerned. Voluntary action would be too slow and isolated to produce any appreciable effect. If, however, it should be thought that the evidence in its favour is not sufficiently strong to warrant so gigantic a scheme, it might at first be tried experimentally in some of the towns where the mortality is so high. The object in view is certainly important enough to justify the experiment, and the expenditure required, by the State.

An Infant Life Protection Act could be passed, rendering it incumbent on Local Sanitary Authorities to establish in urban manufacturing districts a certain number of nurseries; the name and address of all infants are already registered, and visiting officers, who would be appointed under the Act to examine the domestic arrangements in each home, should have power to compel the infants to be taken to the *crèche*, if efficient means for nursing did not exist. Small nurseries, sufficiently numerous to be within easy reach of all, so as to avoid unnecessary exposure, would be most convenient. A staff of nurses, specially educated, should take charge of the children, and a medical officer should be appointed to visit and give instructions on the various medical points in connection with their treatment and management. The parents being thus set free to follow their occupations more diligently, would increase their earnings, and be able to make such payments to the *crèches* as would probably render them self-supporting. The effect upon the infants of pure air, of wholesome and suitable food, and of cleanliness, for at least twelve hours out of the twenty-four, would soon show itself by a reduction in the death-rate. Upon the mother, too, the effect of seeing her children thus taken care of, must be beneficial, both morally and from an educational point of view. A system of education could easily be introduced in connection with each *crèche*, amongst the mothers of the infants. A more kindly interest in the welfare of the little ones would thus be created, and much of the ignorance and carelessness, now so fatal, would gradually disappear. The ideal Act of Parliament should also deal with the other evils already described as so fatal to infant life. Every establishment where infants or children are congregated together should be placed under supervision. Baby-farming, in all its forms, should be abolished; uncertified deaths should not be registered until medical investigation took place as to the cause of death; and this might be done by an officer appointed for the purpose, to whom the medical attendant might also appeal in all doubtful or suspicious cases, without the intervention of a coroner's inquest, until the nature of the case was ascertained. Prescribing by druggists, and the administration of narcotics by unqualified persons, should be rendered illegal. The insurance of children's lives should be prevented, or the insurance companies might be restricted to paying the funeral expenses only. By these means the greater proportion of the infantile population might be brought under the supervision of responsible persons, skilled in the management of the young. Diarrhœa and other diseases would be recognised, and treated in the early stages, and thus graver consequences averted. Dietetic maladies would to a great extent disappear, and infectious diseases would be checked. The numerous cases of systematic ill-treatment of infants, of baby-farming, and infanticide which come to light, and the host of such cases of which we never hear, would be prevented; and finally, I believe, our infantile mortality would be reduced to its lowest possible limit.

* See 'The Social and Sanitary Work of the *Crèche*', SANITARY RECORD, July 15, 1879.

REMARKS ON RURAL SANITATION.

By R. BRUCE LOW, M.D.Edin., S.Sc.Cert.Camb.,
Medical Officer of Health for Helmsley Rural District.

HINDRANCES to sanitary progress in rural districts arise from two causes—1. The Sanitary Authority is overworked and overweighted with other matters besides sanitation, and 2. The officials who advise the Sanitary Authority are in many instances inefficient, and have no inducement to make themselves efficient. In the districts I refer to, the rural Sanitary Authority is of course the Board of Guardians. It consists of members elected annually by the ratepayers. The Sanitary Authority is therefore a fluctuating body, its members being liable to removal once a year, especially if any agitation is got up by ignorant parties against those who have voted against what the agitators conceive to be their interests. The Board of Guardians has, as its principal duty, the administration of the Poor Law. This occupies a large amount of time, requires an enormous amount of patience, and necessitates a very considerable amount of hard work on the part of the members of the Board. Many cases of application for poor relief require to be investigated, and the time allotted to the meeting is often consumed in this way, leaving little time, if any, for the sanitary work or for the other matters that also require consideration. In the districts of which I am speaking, there are no school boards, and the Board of Guardians therefore has the Education Acts to supervise. If the Board and its officials really go into this work, there is no end to the labour and time required for it. The duties are heavy and difficult. In addition to the Poor Law, the Public Health and the Education Acts, the Board of Guardians have the making of the assessments for the districts, *i.e.*, the assessing the property in the

* A Paper read before the Yorkshire Association of Medical Officers of Health, held at Rotherham January 29th, 1880.

union for rateable purposes. These properties include such things as moors, woods, game preserves, all of which are capable of being valued from different points of view, and for this reason there is often prolonged discussion and much wordy warfare before the disputes are settled. Finally there is evidence, in recent legislation, of a tendency to make highway districts coextensive with rural sanitary districts. If the Boards of Guardians have this heavy charge laid upon them, I think they will run a risk of breaking down, or, at any rate, some of the duties will be slurred over or entirely shelved. In defence of the present system, it may be urged that the work may be done by committees, each separate duty being attended to by a small number of the members of the Board, and thus the general meetings would be greatly relieved. It must be remembered, however, that in many rural districts the choice of guardians is limited, and that, as a matter of experience, it is found that the whole work of the Board is performed by a small number of men who have the necessary business aptitude, and who have the time and inclination for the work. If these men were split up and divided among the numerous committees required, the work would, in each committee, be transacted by one man, or two at the most, the rest giving their assent to anything these men suggested, thus saving themselves further time or trouble. Again, in defence of the present system, it may be also argued, that the sanitary business being only taken once a month, whilst the guardians meet once a fortnight, there is opportunity given for keeping place for the sanitary and other duties, without trenching on the important work of poor relief. Even admitting this, there is little enough time for the great and important duty of caring for the public health. Sanitary science requires some knowledge to begin with; and there is only too great reason for believing that, in some unions at least, it cannot receive the attention which it needs, nor can the members of the Board give it the time that is requisite. The fault is not that of the Board, it is the result of the system which has crowded too many important duties upon the present authorities in country places.

The annual changing of at least a portion of the members of the Board of Guardians is unfortunate; for, supposing, they have begun to master the rudiments of sanitary science, and to take an interest in it, they will in all probability have to make way at the annual election for new men, who have no interest as yet in sanitation, and who require to be instructed in their duties. There is more likelihood of this if any member has displayed an unusual zeal in advancing the sanitary condition of the district, for the electors will to a certainty replace him by one whose chief aim it will be to keep a vigilant watch on all disbursements for sanitary purposes. Under these circumstances there is little wonder that sanitation makes so small headway. Unless we have a board whose members shall have a longer tenure of office, and who shall be untrammelled with other work, we cannot expect much change in the sanitary condition of rural districts. With a longer tenure of office, and with plenty of time for the work, the members of the board would gradually acquire year by year a greater knowledge of the blessings which flow from improved sanitary conditions, and as a consequence the public in rural districts would eventually reap the benefit. I would here repeat what I have said before, that I speak in no slighting terms of the country Boards of Guardians. Some of them, personally known to myself, have done and are doing comparatively a great deal of good work; but what I wish to maintain is this, that under the improved conditions I have suggested above, they could do better work and more of it.

The present state of affairs among Rural Sanitary Authorities reacts on their advisers, the Medical Officers of Health. The latter are generally Union Medical Officers, and are therefore in sanitary charge of their own poor-law district. Many men have thus been pitchforked into an office for which they have no inclination, and for which they are not anxious to qualify themselves.

Sanitary science is of comparatively recent date. Until lately it was not specially taught at the medical schools. It has therefore to be learned by all who have not recently had the benefit of instruction in that special branch of medicine. By many practitioners, who have become Medical Officers of Health in the accidental way to which I have above referred, the game is not considered worth the candle. They have no time to study. The hard work of country surgeons leaves no time for going into the mysteries of quantitative analysis, sanitary engineering, or legal enactments. Besides, the duties of Medical Officer of Health clash with those of private practice. A medical man who is a zealous sanitarian frequently offends his patients or those at least likely to be his patients. If he work conscientiously as a Medical Officer of Health, his private practice suffers. It is, therefore, he thinks, against his own interests to push forward his sanitary knowledge. He is placed in a false position. To give him a fair chance of doing his duty without fear or favour, the Medical Officer of Health must be debarred from private practice. Again, the Rural Medical Officer of Health in his reports to the Sanitary Authority must sometimes discuss matters at what may seem considerable length in order to do full justice to the question under consideration. The overworked board are tired and worried with previous work, and are in no humour for reports, long or short. As a natural consequence they always look with more favour on the Medical Officer of Health who says little and writes less, than on the conscientious officer who may to them appear verbose and long-winded. The latter gentleman is therefore often snubbed for his pains. There is every encouragement under the existing state of things for the Medical Officer of Health to become a dummy, and the nearer to that type he approaches, the better for his own comfort and that of the overworked Sanitary Authority. In order to discharge his duties satisfactorily, the Medical Officer of Health must become a specialist and devote his whole time and energies to his sanitary work. The small districts must be combined, and with an enlarged area the Medical Officer of Health would find plenty of work to occupy the whole of his time. From a pecuniary point of view this policy would pay. The general practitioner would be freed from the chances of offending his patients, and the Medical Officer of Health would acquire an extended knowledge of his duties, and would daily become more competent to advise those to whom he was reponsible. The public would gain by it, for, by a large combination, the numerous Medical Officers would be merged in one, whose salary would be no more than the total sum formerly divided between the Poor-Law Medical Officers, the 'dummies' would be swept away, and a distinct advance would be made in the care of the public health. The Sanitary Authorities would gain by it, for by the combination of several

Unions the sanitary work could be done by a committee containing representatives in proportion to the size of each Union. In this way a great responsibility would be lifted from the shoulders of the country guardians in general, and at the same time the work would be better carried on.

In speaking of the combination system as a panacea for all the defects in rural districts, one difficulty is met with, and that is the fact that, as a matter of experience, Sanitary Authorities entering into combinations, are found to be fickle and unstable. If offence be given, intentionally or not, they at once secede, and in this way a good combination which had promised great advantages melts away, and the old condition of things is resumed. To obviate this a combination once formed should not be liable to be broken up at the caprice of one or more Unions, but only with the consent of the Local Government Board, for some satisfactory and sufficient reason. Of the present unsatisfactory state of the law regarding these combinations we have recently had unfortunate examples in the fate of such distinguished sanitarians as Dr. Cornelius Fox and Mr. Wynter Blyth. There is good reason to hope that the coming Session of Parliament will see these grievances ventilated, and that the whole question of tenure of office, appointment, and emoluments of Medical Officers of Health, will be brought before the House. A Parliamentary return in a form devised by that indefatigable worker in the cause of sanitary progress, Mr. Ernest Hart, has been asked for by Dr. Lush, and there is every reason to hope that the whole question will be opened up and discussed. So soon as the stability of these combination districts is secured and the tenure of the Medical Officer's appointment is assimilated to that of the poor-law service, then we shall have the best men coming forward to compete for these appointments. The whole of the country will be mapped out into combined sanitary districts with a thoroughly competent Sanitary Authority and officials.

In returning to speak briefly of the rural inspector of nuisances, I may say that so far as my personal knowledge and inquiries go, he is perfectly satisfactory, but I think there should be some test as to his competence. No inspector with an average knowledge of his work would refuse to give proofs of his competence in Sanitary work. It would add greatly to the progress of sanitation in rural districts, if this office were combined with that of surveyor. In country districts the Sanitary Authority, unless it has obtained urban bye-laws referring to new buildings, has no control over the erection of buildings in its area. It must be remembered that 'Jerry' builders are found in the country as well as in the town. I must admit that some of the owners of large estates in some districts, have their own surveyors and clerks of works, who plan and supervise the erection of houses on proper sanitary principles. But all owners of landed property do not do this, and there is no law to prevent the evasion of this duty. Consequently we have thin walls, damp foundations. ill-constructed and badly-ventilated houses, leading to sickness, poverty, and wretchedness. If the offices of surveyor and inspector of nuisances were united, and a man appointed who had given some proof of his knowledge, having the supervision of a large area similar to that of the Medical Officer of Health, every one would be the gainer. The salaries of such officials, spread over a large area, would be no more than what is at present paid to the local inspectors in the various union districts; both efficiency and economy would thus be secured.

In concluding these remarks on the deficiences of rural sanitary districts, I cannot refrain from referring to the fact that no provision is made for protecting the public from infectious epidemic diseases. In many districts that I know of, there is no attempt to provide a cottage fever hospital for any group of villages, no ambulance to convey infected sufferers, no disinfecting apparatus and no arrangements for notification of infectious diseases to the Medical Officer of Health. Without these arrangements provided beforehand, it is utterly impossible to stay the ravages of infectious disease. The notification, the ambulance, the hospital, and the disinfecting chamber, are all essential; we have not one of them. Any one who is acquainted with the habits and the habitations of the agricultural populations will know at once how utterly impossible it is to treat properly, far less isolate from the rest of the family, cases of fever and the like. A system of compulsory notification is of vital importance. I know that in some quarters there is a difference of opinion on this point; but the necessity of the measure is upheld by so great an authority as John Simon, 'the great apostle of sanitary science'.* The prevention of infectious diseases being an important part of the Medical Officer of Health's duty, I would here venture to suggest an addition to other modes of reducing the deaths from preventible diseases. There should be a law making it compulsory to hold an inquest over the body of every person dying from any one of the preventible diseases, and if the inquiry traced the blame to any party or parties, these should be subject to pay damages to the relatives or undergo imprisonment. By having the Medical Officer of Health officially present at the inquest as assessor to the coroner, the evidence might be easily led into the proper channels. To one more defect I would refer The vital statistics are supplied in a very unsatisfactory manner, but once a year in some districts. In others, the Authority declined to take any steps to supply them, leaving it to the Medical Officer to pay for them out of his paltry salary. The return of these vital statistics, at least once a month, to the Medical Officer of Health, should be made compulsory.

I have endeavoured briefly to point out what I consider the weak parts of the present sanitary system obtaining in rural districts and have suggested remedies. I have advanced nothing that has not been elsewhere advanced on previous occasions by others, but the repetition of these views may possibly help in some way towards the realisation of our hopes for the future. With an improved Sanitary Authority, with scientific medical advisers qualified specially in state medicine, with inspectors and surveyors who have undergone tests as to their suitableness for office, and with improved legislation to back all the officials, the country would awake to a new era. The health of the public would be improved, and as a consequence poverty and suffering would decrease. With better dwellings and home comforts temperance and morality would increase, and drunkenness and immorality diminish. The lower classes, freed from poverty and vice, would rise to new duties and new enjoyments. Our national physique would undergo great improvement; our national prosperity would make fresh advances. The human race, as far as our own country is concerned, would rise a step nearer its original and happy condition, before sin and misery had brought

* See *British Medical Journal* for December 20th, 1879, p. 974.

it so low. Those who have had a share in bringing this about will deserve to be ranked among their country's best benefactors.

NOTE ON THE CONTAMINATION OF WATER BY ZINC.

By Arthur Downes, M.D.,

Medical Officer of Health, Chelmsford and Maldon Combined District.

Some twelve months or more ago, I analysed and condemned the water-supply of a farm-house. A new well was sunk at some little distance, with galvanized iron pipes to a pump at the house. A complaint was speedily made, that the new water had a peculiar taste, and, so it was stated, 'set the children's teeth on edge'. So far as I am aware, no illness was ascribed to the use of the water. Two samples were taken (in July 1879), one from the well direct, the other from the pump. The first proved to be a wholesome water, free from all metallic impurity; the latter contained some iron and much zinc. Since this experience, I have made it a routine practice to examine for zinc each sample which comes into my hands, and, of about one hundred waters, I have detected this metal in four. In two cases the water had passed, I was informed, through galvanized iron pipes, and in each of these instances the pipes were new. Beyond the fact that they were taken from shallow wells, I am not acquainted with the history of the other samples; each, however, contained more or less iron, as well as zinc.

Many years ago, Vauquelin and Deyeux reported that water, when allowed to remain in vessels of zinc, decomposed that metal. Their experiments were repeated and confirmed by a Committee of the French Institute, which showed, further, that distilled water heated in a sand bath, formed a hydrate of zinc, and acquired a metallic taste. Fonssagrives,* in *Ann. d'Hyg.*, 1864, reported the conclusions of a Commission, appointed to investigate the sanitary effect of ships water-tanks lined with zinc. It had been previously shown, he observes, that metallic zinc, in contact with drinking-water, is not acted upon, unless it be in part exposed to the air, in which case the amount dissolved varies with the nature of the water. In experiments on the small scale, distilled water acted more energetically than spring-water, and sea-water than either. In large vessels, however, sea-water appeared to have much less action, and it was supposed that some protective coating was formed. According to Fonssagrives, the compound which results from the action of water upon metallic zinc appears to be, chiefly, the hydrated oxide, with, occasionally, some carbonate. This oxide was 'always small in amount, not more than .07 gramme per litre', and 'partly dissolved, partly suspended'. Dr. Frankland states that zinc is generally present as bicarbonate, and gradually forms a film of carbonate on the surface of the water. I may remark that, in the cases which have come under my own observation, the zinc-compound has appeared to be wholly in solution.

The question whether water impregnated with zinc is, or is not, injurious to health appears to be an open one. Dr. Parkes refers to several cases, in the practice of Dr. Osborne of Bitterne, of metallic poisoning by water which had been in contact with zinc. On the other hand, six convicts at Brest, who for four months were supplied exclusively with water which had been kept for seven months in zinc tanks, appeared none the worse. For my own part I incline to think that if such water were seriously injurious we should have more cases of zinc-poisoning on record, for, since galvanized iron has come so generally into use as a material for piping and tanks, a great number of people in this country must be in the habit of drinking water more or less contaminated with this metal. Be this as it may, the matter appears to me one of some importance, and to which attention has not been sufficiently directed. Without entering upon a discussion of the possible chemical reactions which spring-water might undergo while passing through galvanized-iron pipes, I may state that, in the case of the two samples referred to at the commencement of this paper, the nitrogen as nitrates had been reduced from .820 parts per 100,000 to .060 in passing from the well to the pump, and that the zinc compound taken up by the water greatly augmented its hardness. It would be interesting and important to learn whether in time the action of water upon galvanized iron is lessened. I am inclined to think it is.

* Sydenham Society's *Year Book*, 1864.

THE HYGIENE OF FOOD.

By Ernest Hart.

III.—DINNERS WHICH OUGHT TO BE GIVEN.

The essential and elementary considerations are those which are, perhaps, most frequently neglected in arranging a dinner. I am speaking for the moment of what are called dinner-parties; for I have already elsewhere discussed the economy of the daily round of family dinners; and I propose later on to give, at some suitable time and place, for which I have received now a great number of applications, some hints for a series of daily *ménus* on the strictest principles of economy, variety, and hygienic soundness, which I endeavoured to illustrate in my first sketches 'The Doctor in the Kitchen', see *British Medical Journal* (Oct. and Nov. 1879). Having wandered into the line of discussing festal dinners, and given examples of the dinner which ought not to be given, I should like to gratify some of the many correspondents—critical, appreciative, foolish, and sprightly, of whom so many address me in the most various styles, after the appearance of each of these desultory papers, and in accordance with their wishes, outline some dinners which accord with rational principles of hygiene, economy, and gastronomic requirements. Of course only sketches of principles, and an indication of types can be given, which, as I have already said, will be supplemented by some sets of *ménus*, when at some future time these random gossips may attain a more extended and collected form.

There are obviously various fundamental matters to be considered before constructing a *ménu*. Is the party to be large or small? is economy to be the main and guiding consideration? is the cook very limited in her range of executive capacity? what are the facilities for service? The first and most frequent cause of failure in a dinner party, is the attempt to make it too elaborate and to mimic a state banquet in a friendly repast, given among intimates of, say, the professional classes, in order to instance a *juste-milieu* where moderate means and cultivated intelligence may be supposed to form a good standard for social enjoyment.

Let the dinner be a dinner of twelve—three or four

more than are approved by some strict advocates of limited but well thought-out dinners. A dinner of eight is more easily arranged without any strain of the resources of even a very modestly appointed household, but if the dinner be one of both ladies and gentlemen, and unless the home circle be limited solely to the host and his wife, the limitation is too narrow to allow of any intellectual variety in the guests, or of entertaining friends sufficiently often within the allotted and possible seasons and occasions of dinner giving. Eight or nine persons make up a very pleasant party of men, but a dinner of less than twelve, when the fair sex also lend their charm to the repast, is apt to be too much of a family affair. It may not here be out of place to say that there is a frequent fallacy and source of failure in English dinner parties, in the matter of the choice of guests. There is a tolerably prevalent superstition that 'old people' should be asked to dinner, and that 'young people' only care to dance. This is a great mistake. An elderly man enjoys his dinner the more under the brightening influences of young, fair, and brilliant women; and no dowager will find the hygiene of digestion disturbed by finding herself the object of the friendly attentions of a young and courteous cavalier, who can always console himself for any extra exertion in that way by the social pleasures with which a well arranged dinner party will be replete. There should be variety among the guests as among the dishes; and to ensure a judicious selection of guests, the list of those invited should be entered by the hostess in her diary after every dinner party, together with the *ménu*. And an observant and thoughtful host will not fail to recognise how the various units of his party have seemed to mingle, and where there have been signs of mutual satisfaction, or any indications of politely veiled indifference. Some hosts appear to think that dinner parties should consist as much as possible of people of one set, and often enough they will be found to be exclusively composed of doctors, or lawyers, or painters, and so forth: and even going on to recognition, in the lists of guests, of grades for such a dinner. All this is fatally productive of monotony and ennui, the worst enemies of good digestion, and the fatal kill-joys of the conventional dinner party.

I am much in favour of round tables; they were once popular, but went out of use with the Victorian era of upholstery which has done so much to vulgarise English homes and tastes, but they are now again beginning to re-assert their advantages. A party of twelve seated round a circular table are all within mutually easy view and the sound of each others' voices; conversation can pass easily from dialogue into quatralogue; and all can share the humour of an anecdote, be penetrated by the point of an epigram, or even digest the occasional crumbs of wisdom which a sociable sage may let fall between the removes. Even sixteen may sit at a round table, but this is the largest limit; beyond this number, the circumference of the table becomes so unduly extended that all the advantages of its shape are lost, and only the largest apartment can receive it and yet allow room for service.

The decoration of a round table admits of great variety, fancy, and yet of easily devised systems of decoration. Those who indulge in collections of costly old porcelain, or of the modern cheap pottery of Dunmore, Middlesborough, Limoges, or of well selected examples of oriental colour and shape, especially the turquoise, dragon's-blood, celadon or peacock blue ware of China or Japan—will have no difficulty in making their tables beautiful to the eye without any special or extra expenditure. It is an error in social effect to load the table with ornaments, especially with huge pots of flowers, or étagères, or tall vases, which used to be called épergnes. It is, however, now pretty well understood that large pieces of plate belong to the sideboard rather than to the table, and that table decorations should be low. But even now one sees often a quite unnecessary expenditure on masses of flowers, which must add rather heavily to the cost of entertainments and in some cases diminish *pro tanto* the spontaneous simplicity and absence of visible effort, which constitute one of the imperceptible and rare delicacies of a thoroughly enjoyable repast among friends. A few simple flowers of delicate colour, disposed in vases elegant in shape and pleasing in colour, and arranged at intervals on the table, are often more artistically pleasing to the eye than the most gorgeous set centre-piece of flowers, fresh from the shop of a West-end florist; though when the resources of an establishment include a hothouse, of course a wealth of flowers is one of the most charming tributes which can be offered. Lately, very beautifully coloured flowers of an inexpensive kind have been much cultivated. Tulips of delicate and varied colour in winter and early spring; ox-eyed daisies, hyacinths, crocuses, and other simple but elegant daughters of the garden and of the field, blossoms such as apple-blossom and almond-blossom, are at least as lovely as camellias or any exotic plant. Decorations should always be constructed on a plan and develop a scheme of colour. Often it is the mere miscellaneous and haphazard character of the decoration which robs it of any harmonious or pleasing effect, costly and extensive though it be.

Finally, not to linger on a subject which I could not pass over, but which I certainly have neither the space nor the knowledge to develop in detail, the lighting of a table should be such as not to throw a glare into the eyes of the guests. Lamps or wax candles, shaded with rose-coloured shades, or white opaque shades effect this object; a fringe of lace attached to the rim of opaque bell-shaped lamp shades, also serves the purpose of protecting the eyes, and moderating the diffused light, while the table itself is illuminated brilliantly. At a dinner party the table should be the centre of light and chief subject of decoration, and the moderately neutral tints of the wall and other decorations of dining-rooms are generally such as to facilitate this purpose, when the idea is once seized.

As to the service, it is unwise to attempt to ban the hired waiter, whom so many considerations often recommend to modest establishments. I confess to a preference for augmenting the resources of the service, by adding if necessary, neat-handed women servants. This growing fashion—at least it appears to me to be growing into favour in many of the pleasantest houses—has much to recommend it. The waiting-woman in her mob cap, and quaint lace-trimmed apron, is quick, attentive, quiet, handy, and supplies an air of domestic comfort, which adds to the sense of luxury. A butler or footman is needed to direct the service and the arrangements, when he belongs to the house and knows its ways and his duties. But the small army of blundering waiters sometimes pressed into service are often advantageously superseded by adding the neighbour's waiting-maid to the service, if any addition at all is needed. More often it is in the kitchen that help is required, and extra kitchen-maids are not so often supplied as they should be when additional work is thrown upon the cook.

Now, as to the dinner itself. For such a dinner as that of which I am speaking, the host will probably

like to show his hospitality by giving some additional courses beyond those of his everyday round. He will begin with a preliminary 'whet' for the often-failing digestion, and not always ready appetite of the professional dweller in the city. A few native oysters are, of course, never out of place, but there is no need to serve always this one sort of introduction. We may borrow in this matter an idea from people who develop this part of their dinner more elaborately than we care to do—the Russians. A thin slice of smoked (Dutch) salmon, peppered, laid on a small cube of bread and butter, a miniature block of cucumber pickled in salt, and flavoured with bay leaves and spice, with half a liqueur glass of Riga Kummel (all arranged in the plates prior to the guests taking their places), form a very light but pleasant introduction to the dinner. Three or four prawns resting on a little block of ice, a paste of pounded anchovy in a hot crust, powdered with yelk of egg and chopped capers, these are only one or two of a dozen such trifles which may take the place of the oyster, which is excellent, but should not be omnipresent.

There may be either one or two soups, according as the party is more or less numerous, but as a general rule English people do not care for the trouble, or rather are incapable of selecting for themselves the judicious alternatives in a double *ménu*, and it is in my opinion most advisable to supply only a single set of dishes which may reasonably be expected to suit the taste of all but quite exceptionally fanciful persons. Here at once it is advisable to point out how necessary it is to bear in mind the elementary rule in composing a dinner, which prescribes that the dishes of the successive courses should be neither all white nor all brown, but they should contrast somewhat one with the other. Clear soup may be followed by a substantial and richly dressed fish; on the other hand, a game soup should be followed by a white fish, and so with the *entrées* and successive courses. The dinner which is composed entirely of light dishes is apt to be unsubstantial; one which is made up wholly of brown dishes richly dressed is apt to be indigestible and inartistic. A clear soup, then, being chosen, it should be flavoured according to the season of the year; no attempt should be made to give summer soups in winter by the use of preserved vegetables, but clear soup in winter should be made with meat stock, and should contain fragments of light custard or batter flavoured with tarragon, celery or some winter flavour. Vegetables afford the means of making an indefinite variety of soups, and *purée* of carrot rubbed down with cream makes an admirable soup, known as 'Crécy', whilst less known *purées*, such as those of potatoe, turnip, and chesnut, supply opportunities of varying the soup indefinitely, and variety is specially an object to be aimed at in making out a *ménu*. Of the more substantial soups, turtle, hare, and all kinds of game supply us with materials; the flesh of game being carefully rubbed down to a fine paste thickens the soup, while the bones can be digested by steam so as to yield all their gelatine and flavouring matter. Wine is much abused in England as an addition to soups; when added, it should be put in at the last minute, and delicate wines should be selected, and not a coarse sherry. The habit which many English cooks have of peppering the soup is a cardinal sin, delicately flavoured soup is utterly spoilt by pepper. Mock turtle soup is a compound in favour of which there is nothing to be said, especially now when dried Jamaica turtle may be procured, and real turtle soup supplied at very moderate expenditure. In using dried turtle, the medical caution may, however, be given, that it should be put not only as directed in soak three days before the soup is required, but inasmuch as a slight change has taken place in the surface of the substance during the period of drying, the water should be changed each morning, and the surface of the turtle scraped with a rough brush. I strongly recommend potatoe soup, chesnut soup, sorrel soup, or a clear soup flavoured with celery, as excellent varieties within the reach of any cook, and affording a pleasant change from those which are so commonly served at English tables; a soup made with tomato pulp, added to a very light stock, and served with either rice or broken biscuit, may likewise be recommended. Most clear soups are rendered brighter and more pronounced in flavour if a little grated Parmesan cheese be added at the time of eating, but the Parmesan must of course be served separately and only added by those who like the flavour.

For the course of fish we have in England unequalled resources, and here it must be borne in mind that the fish selected and the mode of dressing it should have a relation to the soup which has been served. If turtle, or hare, or game soup have been previously served, then the fish should be white and delicate. If the dinner is to be short, substantial, and limited in courses, the famous turbot is well in place, but there is no reason why lobster sauce should be the invariable accompaniment of so solid a fish. Dutch sauce, or a sauce of anchovy butter, or a clear butter sauce, made by melting butter and adding to it yelk of egg and weak stock (of course without the abominations of baked flour to make it into bookbinder's paste), make a pleasant sauce, especially if the turbot be garnished with lemon or capers, or some similar adjunct, to give pungency to its otherwise somewhat tasteless character. Other cheaper, lighter, but yet delicate fish, may be employed, such as small haddocks stuffed, baked and flavoured with pepper, salt, and brown butter, if something simple be desired, or sole, filleted and *souché* like Thames flounders. These examples will serve to show what I mean by a delicately cooked fish to follow a rich soup. On the other hand, if the soup be a light clear soup, then some fish broiled or grilled, served *en papillote* or broiled in cutlets, with a brown or *tartare* sauce, or mullets stewed in a brown gravy with capers, or a *sole Normande*, will serve to indicate the richer modes of dressing fish, of which there are an infinite variety. Whitebait in season may always be served as an extra course of fish where a proper whitebait basket is at the cook's service, otherwise whitebait served at a private house is a very undesirable addition to the dinner. Generally speaking, one may say that the cooking of fish in England is well understood at Greenwich, and anyone who wants a lesson in ordinary courses of fish will do well to graduate at the Trafalgar, making it understood that he proposes to study the dinner and not to devour whatever is put before him, for we question if fish dinners may not be badly cooked there as well as elsewhere, and indeed frequently are when the parties are large. When one fish only has formed the course of fish, as it very properly may, it is not inappropriate to supply a light fish *entrée* to follow, as for example, fish roes *en soufflet* with cream, or pounded lobster in rissoles, or oysters wrapped in bacon, and slightly grilled. Cheap fish should not be despised. There are few things which will be more generally approved than well-selected

fresh herrings oiled, rubbed with a little mustard, and well grilled. All kinds of coarse fish may be served, either baked or boiled, with butter which has been browned in the frying-pan, and to which a touch of white vinegar or lemon juice has been added.

The joints and the *entrée* to follow the fish must be regulated by the preceding dishes. Supposing that a light *entrée* is required, an abundance may be selected from any good cookery book, and no other observation need be made than that the principle should be adopted of making this *entrée* a really good nourishing food, and not an unsubstantial pretentious mixture which no one cares to eat, and which is put in for the sake of appearance. An ordinary dinner is much better without *entrées*, unless the *entrée* be treated with respect. Lamb cutlets, with fresh green peas; pigeons or quails, dealt with in half a dozen ways, stuffed, served with olives, with chesnuts or with truffles, will supply an agreeable variety; or for a dinner of men the undercut of the sirloin cut into small slices, and served with marrow, anchovy butter or olive sauce, makes a substantial *entrée* which precludes the necessity of anything else than light things to follow. The *pièce de resistance* may be chosen at will, but it should be varied. A roast leg or saddle of mutton, with the suitable accompaniments of either young green peas or French beans, or young carrots glazed and stewed with sugar; in fact with any of the choicer vegetables of the season, is always a course of undeniable excellence. Served at a dinner party the utmost care should be taken to see that it is served on a hot-water dish; that the gravy spoon is plunged in hot water before it is used for serving the gravy; that the plates are as hot as their costly character will admit; in fact that every precaution is taken to insure perfection in this course, which is chiefly valued by reason of the superior excellence with which on such occasions a simple dish of roast meat ought to be served. The undercut of a sirloin larded, roasted, and served with Brussel sprouts, or surrounded with mushrooms or baked tomatoes, makes a pleasant change from the simple roasted joint which is of so everyday a character. If a turkey be provided it is, of course, well if it can be stuffed with truffles, but this stuffing is far too costly for ordinary turkeys and for ordinary purposes; in such case chesnuts boiled, pounded, and mixed with butter, spices, and bay-leaf, and put under the raised skin of the breast, will give the bird an excellent flavour. In preparing a leg of mutton it will be found that if a clove of garlic be inserted into the shank of the uncooked joint, which should be hung a few days before roasting, enough of the flavour will have penetrated the meat to impart a very slight but delicious *goût* to the whole of the joint, which will be universally recognised as agreeable; while persons who proclaim themselves most loudly as absolutely intolerant of the flavour of garlic will be quite unable to detect its presence, and will only join others in admiring the flavour of the meat. Braized beef or mutton, with a *purée* of haricot beans and fried onions, will be found a most pleasant addition to the resource of this course; though, of course, I cannot pretend here to more than merely suggest some slight indications for a dinner. This course should be followed by a salad. If only a simple salad of fresh lettuce, with the ordinary French dressing, oil, vinegar, pepper, and salt, be supplied, it may be given with the meat on a separate plate. Although so much difficulty is made about fresh salads, the truth is there is no one who cannot make a good salad, if they will take the trouble to select fine fresh lettuces, to get good pure salad oil and white wine vinegar. The salad having been dried by waving in the air, need then only be taken into the fingers, and broken into good-sized pieces, watered with two table-spoonfuls of fine salad oil, sprinkled with salt and a little pepper, and then with half a table spoonful of white vinegar, and stirred lightly with a wooden spoon. There are a great variety of salad materials which should not be neglected, the *barbe de capucine*, chicory, dandelion leaves, and corn-salad, all make excellent salad; cold boiled potatoes sliced, mixed with slices of beetroot, and a little chopped onion, and served with the oil, vinegar, salt and pepper dressing, is always an agreeable salad; so also are cold boiled cauliflower, and many other vegetables. Where the salad forms a course by itself, it may be well sometimes to make it more varied and more solid by adding to it lobster and mayonnaise sauce, so as to make a lobster salad, or by serving with it a dressed crab, or by making what is known as salmagundi, composed of boiled potatoe cut in small pieces, shreds of beetroot, small slices of apple, raisins, olives, anchovies, or fillets of pickled herrings; this salad may be varied in a dozen different ways, and is always well relished in winter. A course of choicer vegetables may take the place of a solid salad; as artichokes, asparagus, young carrots, or young turnips, glazed and browned with sugar, peas stewed with butter and white sugar, and French beans, cooked in various ways. There is an endless variety of resources from which to compose this course—a course too often omitted from English dinners. As to the sweets I shall say nothing. The resources of the house and of the cook ought to suffice to supply always an infinite variety of sweets from the rich supplies which the market affords of fresh fruits in the summer; of canned fruits, peaches, pine-apples and the like in syrup during the winter. Pine-apple stewed in syrup, and served on warmed sponge cakes; peaches stewed in syrup, and served on rice with garnish of angelica; cream whipped with sugar, and served over chestnuts, boiled and rubbed through a sieve with pounded sugar, are some of the simpler kind of sweets which are always within reach and are always acceptable. A word as to the ices. An ice machine may now be obtained at a very little cost. The making of ice is an art which can be acquired by any cook in a couple of hours, and the cost of the ice and ice pudding is so trivial, that this pleasant crowning of any repast is within the reach of any intelligent person, however narrow may be their resources. At a bachelor dinner, the meal generally concludes with such things as cod's roe, grated and served on hot toast; the soft roes of herrings broiled and served on toast, and anchovy toast; Bath Oliver biscuits, buttered, peppered, and broiled, or some similar course, intended to remove the impression of sweetness from the palate, and to prepare it for tasting a choicer dessert wine. I am, of course, far from suggesting that all these things should be given at one dinner. A dinner *ménu* should not include more than the guests may reasonably be expected to eat, with benefit to their digestion, and advantage to their health the next day. A soup, one fish, one *entrée*, one *hors d'œuvre*, a *pièce de résistance*, a course of vegetables, salad, and two sweets, are, in my opinion, as much as is necessary to give at any dinner party; nor should any such entertainment exceed an hour and a-half in duration. The well-known ideas which I have here brought together will, I hope and believe, if they are considered as typical suggestions, help to revolutionise many a dinner party, and

relieve it of the reproach of tedious monotony, to which I referred in a previous article.

I shall take another opportunity of referring in detail to some dinners which I gave, with the object of proving that these principles of construction, cooking, and arrangement of the dinner party, here developed, can be carried out with the most moderate expenditure. Some mention has already been made in the SANITARY RECORD of these dinner parties, in which to make the demonstration the more striking, I arranged that the cost of materials should not be more than one shilling per head for eight courses. I have given four such dinners to a party of friends, and the verdict in all cases was one of high approval of the dinner, which, in the words of most of the guests, did not differ from any ordinary dinner party in any respect, except that the dishes were more abundant than usual, and much nicer than those generally supplied at the average professional dinner party.

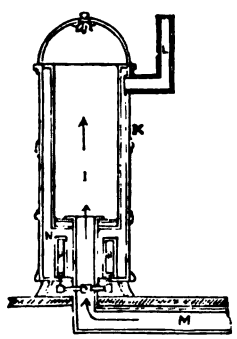
A DICTIONARY OF SANITARY APPLIANCES.

BY W. EASSIE, C.E.

(*Continued from p.* 296.)

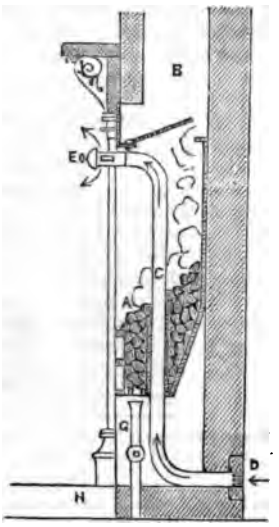
AIR.—XXXI.

DELIVERY OF WARMED AIR (*continued*).—Perhaps the first gas 'calorigen' introduced into notice in our country was that invented by Mr. Jabez Goode, of Birmingham, in 1856. It is sufficiently unique not to be passed over when dealing with stoves heated by gas, that are meant to convey air from without, which has been heated, into the body of a room. In this modification of stove the heated air delivered from the stove into the room is supplied, as usual with calorigens, from the atmosphere external to the room. When the stove is in action, air from the outer atmosphere, entering by the air-inlet tube, becomes heated in the larger chamber of the stove, and passes into the room through the perforations in the top of the stove. In order to prevent the bottom of the chamber becoming so strongly heated as to communicate an odour to the air, he interposed a layer of sand between the flame and that portion of the bottom of the chamber with which the air passing into the room comes in contact. By this means the temperature of the bottom of the chamber is prevented from becoming so high as to communicate an odour to the heated air passing into the room. The temperature of the interior of the chambers is sufficiently high for cooking purposes, and they may be converted into cooking ovens by having doors on their sides opening into the room. When he used the chambers for cooking purposes, he closed the tops of the chambers with a flat, unperforated plate on which saucepans or other vessels could be kept at a boiling temperature.



Vertical Section of Goode's Ventilating Gas Stove.
H H, gas burners; I, bottom chamber of stove; K, the body of stove; L, flue for conveying away the products of combustion; M, fresh air inlet from without; N, layer of sand.

It has been very common to make use of gas for heating a room by the use of fireclay balls, or asbestos, in the grate. But within the past year or two a device has been introduced, by which air from without can be heated and delivered into the room, below the frieze of the mantle. This arrangement is due to Mr. Henry Masters, an architect of Bristol, but he has not patented it. In the winter time, when the fire is alight and the air inlet open, there will be a delivery of warm air into the room, the temperature varying with the size of the air duct, and in the summer the arrangement can be made to yield a supply of fresh air, somewhat warmed by friction in the tube.



Vertical Section of Masters' Gas-fire Ventilating Grate.
A, incandescent material; B, chimney; D, fresh air inlet; E, warm air delivery into room; C, fresh air shaft; G, burner; H, hearth.

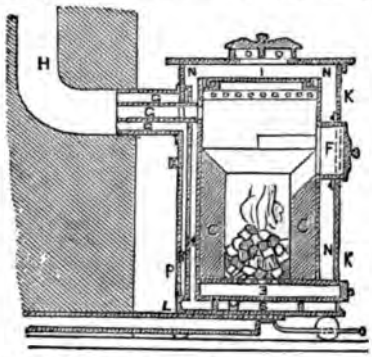
Mr. Masters has found a considerable saving of gas by the introduction of this arrangement; and when a Boyle's mica valved ventilator has been fixed in the chimney breast at ceiling line—but not into the flue up which the products of combustion from the gas pass away—a good result has been obtained, both in the direction of heating and ventilation.

Last year Mr. Bryam, of Bradford, brought to notice a device of his for the delivery of air warmed by gas, and here the heating chamber, preferably made of copper, is fitted on a frame forming the air chamber. The atmospheric air enters the chamber through a pipe, and in the pipe affixed to the air chamber is fitted a damper to regulate the flow of atmospheric air, which passes from the air chamber through the tubes or pipes circulating in them, and passes into a hot-air chamber fitted on the top of the heating chamber, and from there through pipes to warm the required room. The pipe connected to the hot-air chamber is also fitted with a damper to regulate the flow of heated air.

In the ordinary Arnott's stove, the fresh air is not taken into the body of the stove where it is heated previous to being discharged into the room; but this shortcoming, if one it were, was provided against in an improved Arnott's stove, on the ventilating principle, which was brought out by Mr. W. Jeakes, of London, in 1838.

Mr. Jeakes's improvement consisted of an appendage by which a current of cold and pure atmospheric air was brought in contact with the sides of the stoves, and after being heated by that means, discharged into the room for the purpose of warming its atmosphere. He surrounded the stove entirely by a casing, which enclosed it, forming air passages all round, and by means of a pipe or tube, leading from some convenient opening, he introduced atmospheric air, either from the exterior of the house or from another apartment. This air was brought through an opening in the bottom of the casing into the lower part of the chamber, and from thence rose up the passages at the sides of the stove, taking up the heat as it passed, and was discharged through openings

in the top of the stove into the room. By these means a constant current of warm air was supplied to the room, and that air which was cold, or had



Vertical Section of Jeakes's improved Arnott or Ventilating Stove. C C, fire-brick lining of furnace; K, surrounding casing of stove; L, fresh air inlet tube; M, opening for fresh air into lower part of chamber; N, passages for warming of fresh air; O, openings for delivery of warmed air into room; P, opening from room into annular pipe, Q, surrounding flue, G, for removal of air vitiated by respiration; H, chimney; F, door for fuel; S, slide, moving on wheel when air inlet, M, from exterior atmosphere is closed.

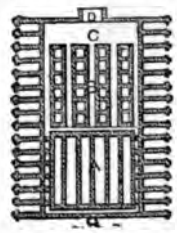
been rendered heavy by respiration, was drawn off through an opening, and carried up an annular pipe into the chimney. A constant circulation of the air in the room was thus effected, and a ventilation obtained, which he claimed to be a great relief in a close room where one of Dr. Arnott's stoves was used, having, as they always had, the mouth of the chimney closed at bottom. When it was not required to introduce cold atmospheric air from without, he excluded it by moving the wheeled slide under the exterior air inlet opening, thus shutting off the communication with the tube. The atmospheric air of the room then passed in a current up the channels by the sides of the stove, and was discharged at the top in a heated state, thus producing a circulation of air which warmed the apartment.

There are numerous high temperature stoves, such as the cockle or Belper stoves, used for warming large buildings, and which are constructed of large surfaces of metal or brick-work, heated by a fire, a furnace, or a stove, the fresh air being made to impinge upon their surfaces, and then carried along to the rooms where the heat is required, in tubes suited for the purpose. But these are suited for the most part to large buildings only; and as these papers are mostly intended to deal with contrivances which are more useful for houses, it will not be needful to deal with these stoves here. There are, however, several kinds of them which are applicable to house work, and one or two of these I will describe.

Elevation of the Goldsworthy-Gurney Stove with gills, for use inside the room.

A stove of this kind, which will always command attention by its general efficacy, is that known as the Goldsworthy-Gurney stove. It consists of a stove with a plain smooth inside cylinder, and a collection of upright wings or gills on its outer circumference, which when heated, impart the heat to the entering air before it is led to the tubes in communication with the rooms to be warmed.

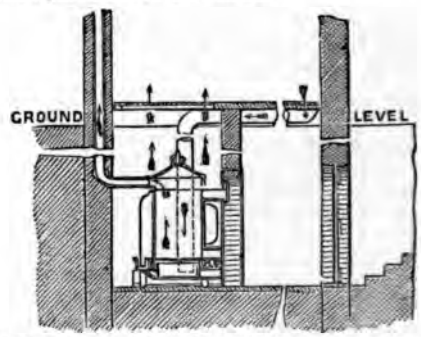
In some cases, stoves of this description are simply placed in the room, and heat by radiation only, and articles of this description are manufactured of many patterns. One in use is that of Messrs. Smith and Sons, of Barnard Castle.



Plan of Smith and Sons Gill Stove. A, fire-box; B, interior tubes; C, smoke-box; D, stove-pipe.

When the fire-box is full of heated air and gases, they enter the interior tubes, and at the end of this collection of these ducts, about twenty-four in number, is a smoke-box, where the products of combustion are forced through before they can escape by means of the ordinary stove-pipe.

The Goldsworthy-Gurney stove, which is manufactured by the London Warming and Ventilating Company of Westminster, is also used where the apparatus is concealed from view, namely, in a room below, and the entering air is passed through the stove, and up through gratings into the apartment to be heated.



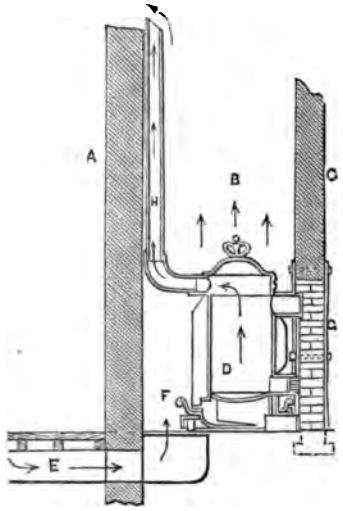
Vertical Section of the Goldsworthy-Gurney Stove, for use below the floor.

These stoves are for the most part placed in pans of water regulated to produce the requisite amount of evaporation.

An improvement upon the ordinary Gurney's stove, by which dirt from stoking and firing the stove was prevented from entering the room which was to be warmed, as also any leakage of gases should any down-draught occur, was invented by Mr. W. Woodcock in 1867. He also claimed to make use of all available heat from the flue-pipes, and by leaving a space above the stove in the stove-chamber to cause a more rapid passage of the air to be warmed over the stove's surface.

Mr. Woodcock's proposed improvements are not only applicable to stoves of the character of Gurney's stoves, but to any stove having a number of plates from its outer surface with vertical plates in a trough of water, or any stove of analogous construction or action. The stoves are constructed with feeding door, fire door, and ash-pit door so arranged that they shall open into a stoking chamber or compartment which is otherwise entirely separated from the stove; such stoking chamber or compartment being wholly separated from the building to be

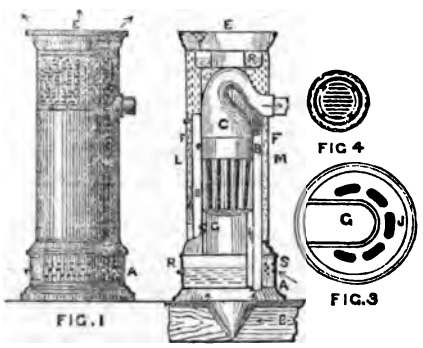
warmed and ventilated. The feeding door is so arranged as to exclude the outer air, but opening to



Vertical Section of Woodcock's Improved Gurney Stove.
A, the room to be warmed; B, stone chamber, here on same level as A; C, stoking chamber; D, stove; E, cold air flues; F, cold air inlet-grating; G, doors and front part of stove; H, flue-pipe.

any pressure from within. He prefers that the stoves should be enclosed in a chamber partially separated from the building to be warmed and ventilated, that is, separated except as to its communication with the building, by means of passages or flues for the conveyance of warm air from the stove to the building, and the cooler air from the building to the stove. He also added sometimes to the pipe of the stove at a convenient elevation a second or dummy stove, drums, horizontal lengths of pipes, or enlarged pipes, so as the more effectually to exhaust the heat, and distribute the same into the building.

There is a new system of hot air-stoves used in Belgium which is based on the law of gravity of air, and by which means a uniform temperature is ensured, ranging between 63° and 69° Fahrenheit. It is intended to provide for continuous ventilation

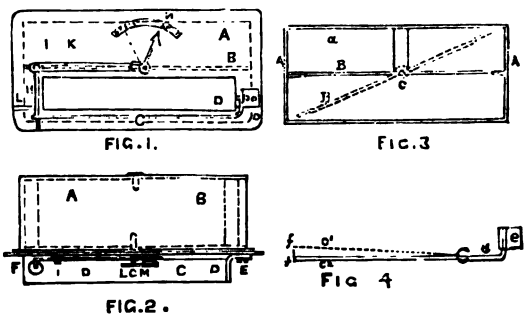


Peron's Ventilating Stove. Fig. 1, elevation of stove; fig. 2, vertical section through centre; fig. 3, sectional plan on line R, S; fig. 4, plan on line L, M.
In the centre is the combustion chamber of metal with corrugations; A, entrance for air, which passes over the corrugations to be deprived of noxious matter; C, metal hood, with increased heating surface for saving of fuel: B, the inlet for air which passes between the cover, F, and the cover of the combustion chamber, thus heating the air for diffusion within the rooms by the opening, E, at top of stove, having been saturated with moisture in the reservoir, E, which is kept full of water, and aids the combustion; G, poker-hole.

and diffusion in apartments and halls, of pure air charged with sufficient humidity; and further, which is very desirable in crowded districts especially, it is meant to provide for the discharging into the atmosphere only air that has been deprived of all kinds of impurities, and which has been entirely carbonised before being discharged from the chimney. Furthermore, by this system there is less soot produced, and the risk of chimney fires is reduced.

It will be seen by the foregoing, that these stoves are constructed of a fluted pot-like chamber of cast iron, within which is the fire, and this chamber is enclosed or encased by a shell or cover of sheet metal, which is closed at its upper end by a metal cover or lid—a construction which allows of the carbonization of the vitiated air, and greatly increases the heating surface, with a corresponding economy of fuel.

In article XXVIII (SANITARY RECORD, Dec. 15, p. 240), I gave an example of an automatic ventilating outlet, designed by Messrs. Symonds—and which I had seen in action—being worked by an electrical current. Within the past year, an apparatus of this automatic kind has been introduced, only set in action by the differing expansiveness of two blades of varying metals. Its action is too complicated to receive due description in these pages; but the inventors, Messrs. Gilmore and Clark, of Lower Norwood, would doubtless supply all necessary detail information.



Gilmore and Clarke's Self-acting Ventilator and Temperature Regulator. Fig. 1, front elevation, shewing index; fig. 2, plan; fig. 3, longitudinal section, showing valve shut and open; fig. 4, diagram edge view of spring. B, rotary valve fast on axis, C; C, spring composed of two metals, iron and zinc, united to form one spring; A, box or casing.

The invention relates to apparatus for ventilating, for regulating temperature, for indicating heat, and for sounding an alarm when the temperature of any place in which the apparatus is applied is raised beyond a maximum determined degree. This apparatus consists essentially of a spring composed of two or more blades of metals of different expansive or contractile powers, so arranged that as the temperature is raised the spring will expand and curve, and on the temperature being again lowered the spring will return to its normal condition. The spring is constructed and connected with a rotary valve, and employed in combination or not with indicating or alarm apparatus, according to the purpose or purposes to which the invention is required, so that the movement of the spring in its expansive or contractile action will be transmitted to the valve, and, if desired, to the indicating or alarm apparatus.

T.

MILK-POISONING.

By William Iliffe,
Medical Officer of Health, Derby.

On Sunday night, March 7th, at 9.30, I was summoned to attend four children in one house, whose ages varied from four and a half years to nine, and two in another close by, aged five and seven years, whom I found suffering from sudden violent sickness and vomiting, with abdominal pain and marked prostration.

All the children had partaken of milk for tea, at five o'clock, which was supplied by one man. No other cause for the illnesses being ascertainable, my attention was particularly drawn to this fact. Some of the remaining milk being shown to me, its appearance betokened something unusual, and although not curdled, litmus discovered it to be of an acid reaction. This disclosure induced me to proceed further in this direction; consequently, on the following morning (Monday), I visited the farm from which the supply came. Fifty cows formed the dairy, and out of this number two were observed to be suffering from a disease, called in veterinary language 'The Grapes', but as one of these cows proved to be dry, my thoughts were directed more particularly to the other one, which had been regularly milked with the rest, and no distinction made; its milk going with the general supply.

The farmer being surprised that I should lay stress on the desirability of separating the diseased animal's milk from that given by the healthy ones, and of not supplying it for the purpose of human consumption, I suggested that two small basins should be brought, and into one milk be drawn from the diseased cow, while into the other some be procured from a healthy one. This was done in my presence, and litmus paper revealed the fact that the milk from the diseased cow was of an acid reaction, and the milk from the healthy one was not. Here, then, appeared the fountain head of the cause of the sudden illnesses of the children above referred to. In two other families distant a mile from each other and from the first ones, I have since found out four other children who were similarly attacked on the same night, both taking milk from the same source as the first families, and probably others might be discovered were I to go the round of the customers

It may incidentally be mentioned that boiling the milk appeared to destroy the power of the poison; since an infant two years old belonging to one of the families, although imbibing a larger amount of the noxious fluid than the others, yet as the milk was mixed with some farinacious food and previously boiled, escaped altogether its evil effects.

The above facts indicate that medical men should be on their watch for similar cases and their probable causation.

The symptoms, after about four hours' duration, ceased, and the children the next morning were in their usual state of health, notwithstanding that a homœopathic chemist got considerable kudos for his speedy cure of one of the cases by his globules, little thinking that the others were as speedily benefited by nothing at all, nature effecting their restoration in her own way, unaided by art.

H.R.H. the Prince Christian of Schleswig-Holstein will preside at a public dinner, at Willis's Rooms, St. James's, on Friday, the 7th May, in aid of the funds of the Hospital for Women, Soho Square, W.

THE
SANITARY RECORD.
MARCH 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

STORM OVERFLOWS.

It is hardly possible to over-estimate the importance of a question which is now constantly on the lips of local Authorities and engineers engaged in sanitary works. Ought not surface and subsoil waters, as well as trade liquids, to be positively excluded from sewers? There is much to be said on both sides of the proposition. If it were legally declared that all liquids should be compulsorily excluded from sewers, other than that which is generally called 'sewage proper'—which we understand to be the water supplied to dwellings for use in drinking, cooking, and washing,—we should not only fail to conform to the intentions of the Legislature as expressed in the Rivers Pollution Prevention Act, but we should have to contend with difficulties so great as to make the obedience of the law an impracticability—a condition which it is needless to say would vitiate any Act of Parliament. If we look to the wording of the Rivers Pollution Prevention Act, 1876, we shall find that it is there declared that every sanitary or other local Authority shall give facilities for enabling manufacturers within their districts to carry their liquid refuse into the public sewers, provided that such liquid shall not prejudicially affect the sewers, or the disposal of the sewage, and that the sewers are sufficiently capacious to receive such liquid. The views of Parliament thus expressed have already resulted in the admission of much trade liquid, which would otherwise have been excluded from sewers, and there is no doubt that this bonus to trade will extend rather than diminish the influx, with varying effect upon sewers and sewage disposal. It is not, however, our intention at this moment to dwell upon the important questions involved in the admission of trade liquids.

In the engineer's ordinary practice it is found, even where there is an earnest intention on the part of Local Authorities to keep foreign waters out of their sewers, as far as practicable, that it is next to impossible to exclude the rain falling on the back roofs of houses and buildings, as well as that falling on inner yards and paved surfaces; except at extraordinary cost, this water cannot be conveyed to the gulleys which receive, and the drains which take away, the water thrown off public roads and streets. Moreover, it is well known that the off-flow from some streets and courts in crowded towns is as dirty as sewage itself. Not only are there collected in those

places the excreta of animals frequenting them, but there is cast out upon them much of the inner filth of adjacent dwellings, and it is, therefore, certain that such off-flow ought to be made tributary to the sewers to undergo cleansing, rather than be discharged directly into the rivers. The consequence of this admission is, that under the most favourable circumstances, there are times when the public sewers of all towns are overcharged, and require an outlet independently of the means taken to cleanse the sewage; but although this is the fact, it does not follow that every effort should not be made to reduce, as far as practicable, the influx of surface waters, and so limit to a minimum the recourse to storm overflows. To this point the Conservators of Rivers, created and to be created, must, sooner or later, direct their attention. The outlets called 'Storm Overflows' cannot be done without; they are the safety valves essential to all systems of sewerage and sewage disposal. It is not sufficient, however, to declare that when the sewers of towns are overcharged by the dilution due to rainfall, they should come into operation as a matter of course. It is true that the volume of rivers is, at such times, also increased by the off-flow from ground surfaces tributary to such rivers, and their waters cannot, therefore, be made much worse; but there must be a limit to the frequency with which our rivers may continue to be polluted under conditions of excess. We do not propose to suggest a rule, but it appears to us that the sooner some reasonable view or interpretation of the law is recognised, the better for all concerned. It is quite certain that no mode of cleansing sewage and trade liquids by chemical process in tanks, or by irrigation over, or filtration through land, can be effective when they are diluted by the rainfall on extreme occasions, even though the area tributary to sewers in towns be limited to the roofs and paved surfaces to which we have particularly referred.

It is easy enough, if sewers are water-tight and made to exclude subsoil water, to deal with the dry weather sewage and liquid trade-refuse if they are an ascertained and positive quantity, but it is utterly impossible to provide any means of cleansing foul liquids which may be swollen by sudden and extraordinary dilution. We have only to realise the fact that fifty acres of surface upon which two inches of rain has fallen in twenty-four hours will throw off 2,262,200 gallons—and the back roofs and yards, with back streets and courts of a town of moderate size, will readily cover fifty acres—to acknowledge the utter impossibility of conforming to the Rivers Pollution Prevention Act by any treatment of sewage so diluted. Again, if this same diluted sewage has to be lifted by steam or any other motive power apportioned to a normal condition of things, it is certain that the operation cannot be performed, nor could it be performed if, instead of two inches spread over twenty-four hours, the fall of rain should happen to be half an inch in two hours. Hence the necessity of storm overflows into the river or outfall-stream with which nature has provided the district; for if no such means of discharge exist, the confined sewage would pass back into the town, and cause a much greater evil than could result from any flow into a natural outfall. We are led to make these remarks because many Sanitary Authorities are still evading the duty, now recognised as necessary, not only by engineers, but by every one who has devoted much attention to the subject, of separating surface waters from sewage as far as practicable.

It was only last week that the Thames Conservancy Board, while openly acknowledging the superior character of the works carried out by the Abingdon Corporation for the purification of their sewage by intermittent filtration, and the success that has attended them, summoned that Authority for polluting the Thames with 'sewage'; it being stated by the solicitor of the Board that on a certain day in October last the only storm overflow in existence came into action, and discharged unmitigated sewage into the river. The case was brought before the Petty Sessions at Abingdon, when the Conservators failed to show, in a legal and tangible manner, that the sewage of which they complained was taken from any outlet really connected with the works of the borough, and the summons was dismissed on this technical ground. Though such was the result, a warning has been given which it will be well that Sanitary Authorities generally should take to heart. Particularly should the Joint Board of the Lower Thames Valley Main Sewerage consider it, for the Conservators will sooner or later have to deal with the question in a comprehensive manner.

The Joint Board propose to take the sewage of the populous districts of Isleworth, Barnes, Mortlake, and Richmond from alongside the river, where it is tidal, through Kingston and Surbiton, to land some miles above Teddington Lock, which separates the highland waters of the Thames from the tidal reach. The question of storm overflows must in this case become one of the highest importance, for a discharge which would be admissible into the tidal waters of the Thames would be resisted above.

Though Mr. Thornhill Harrison, who is presiding at the inquiry now pending at Kington, may leave the Joint Board to its own devices when the question arises, we await with considerable interest his report, as the separation of surface waters from sewage in the subordinate districts is not only a difficult task in itself, but it is made more difficult by the fact that the existing sewers are known to be leaky and constantly subject to a large influx of subsoil water.

At the Hygienic Laboratory in University College, under the direction of Professor Corfield, assisted by Mr. C. E. Cassal, students are instructed in all kinds of analyses relating to public health, it being the only special laboratory of the kind connected with any of the London Medical Schools.

NOTES OF THE MONTH.

SEWAGE IRRIGATION AND FROST.

A writer in the *Revue d'Hygiène* has drawn attention to the fact that during the cold weather, when the thermometer marked in the streets of Paris nearly zero (Fahrenheit), the temperature in the drains remained always above freezing-point, notwithstanding which, the authorities stopped the machines which pump a certain quantity of the sewage on to the plain of Gennevilliers. The market-gardeners of this suburb asked the engineers to continue the sewage irrigations, to clear away the mass of snow which covered their fields, as also to save their vegetables frozen up with the soil. The irrigations were, therefore, continued at Gennevilliers during the most severe cold, and the vegetables from this source contributed to a large extent to provision Paris when from the other usual ones the market-gardeners were unable to send in any vegetables. Thermometric observations showed that the sewage, after having been filtered through the soil, still retained a temperature of + 10° and + 12° centigrade (that is, more than 50° Fahrenheit) when it issued from the drain, and ran into the Seine. This is a fact worthy of attention at a moment when the value of sewage as a means of irrigation is under discussion.

THE LIVERPOOL SEWAGE STEAMER.

The screw sewage steamer *Alpha*, belonging to the Liverpool Corporation, has made her first trip to sea with about 250 tons of town refuse. The first voyage made by the new vessel proved satisfactory. She occupied about four and a half hours on her outward and three and a half hours on her homeward passage, and is said to be an improvement upon the screw hopper barges of the Mersey Dock and Harbour Board. The voyage occupied eight hours altogether, or within one tide, and this answers the requirements. The new vessel, which differs materially from the ordinary hopper barge, was built by Messrs. William Simons and Co., Renfrew, a firm who have for many years advocated the use of such steamers for the disposal of town refuse.

ARSENICAL POISONING FROM WALL-PAPERS.

In his recently published annual report, Dr. Seaton of Nottingham writes:—'At the beginning of the year I reported certain cases of illness due to this cause that had come under my observation, and it was ordered that handbills should be printed for general distribution through the town. This was done, and they were extensively circulated, especially among paper-hangers. Since then other cases have come under my notice, and I will briefly detail the facts concerning one group which occurred in the practice of Dr. Hatherly, of Radford, and which serves as an illustration of others. Mr. and Mrs. R— and family, consisting of two little girls, aged respectively five and three years, and a baby nine months old, together with two maid servants, went to reside in a newly-built freshly-papered house, about to be opened as a hotel at New Basford at the end of July last. The rooms were papered throughout with papers of two different patterns, both of which were coloured with pigment containing Scheele's green in the proportion of ·596 and ·522 grains per square foot respectively, as was subsequently shown by the analysis of Dr. Truman. Soon after they commenced residence every member of the household, with one exception, suffered severely from symptoms which are well known to be due to arsenical poisoning. One of the servants was so ill that her mistress sent her home. She then recovered in a few days, but on her return suffered again in a similar manner. The only member of the family who did not suffer in an evident manner was Mr. R—, and this would be accounted for by the fact that he was a good deal from home at the time. As soon as suspicions were confirmed by an examination of the papers, the walls were stripped, and in a few days the patients were well. Upon the receipt of Dr. Truman's report, I wrote to the occupier of the house suggesting that he should take legal proceedings against the tradesman who sold him the poisonous paper. This suggestion was, however, not acted on, and the matter was allowed to drop. My reason in urging the adoption of this course was that the institution of legal proceedings in cases of this kind gives greater publicity and calls public attention more forcibly than can be done by other means, such as the issue of handbills, etc.' Dr. Seaton is of opinion that in this case good grounds existed for the award of some pecuniary compensation.

DETECTION OF LEAKAGES IN DRAINS.

The recent proposal of Lieut.-Colonel Hale to make use of ether for the purpose of detecting leakages in drains is novel, as far as regards its use in drains, but it is commonly used in the search after leakages in gas-pipes, the ether being put into the pipe, and a force-pump used to drive it to the place where the gas-pipe is unsound, which it never fails to discover. It is, however, very unsuited for use in drains, and if concentrated anywhere, owing to a stoppage, and were there, as there frequently is, carburetted hydrogen in the drain, and a light led near to it, an explosion would result. The best thing to make use of is some combustible material, such as shavings, or coarse brown paper—anything, in fact, that will make an abundant smoke when fired, and that has a pungent smell. This is also used with success in soil-pipe testing. It is better than, perhaps, any other thing for the purpose.

SANITARY MATTERS AT GOOLE.

Mr. E. C. Buchanan Tudor Timms, Surveyor to the Goole Local Board, and Surveyor and Inspector to the Rural Sanitary Authority, Goole Union, has designed and prepared drawings, showing existing defective sanitary arrangements, and illustrating how to avoid and remedy them for yards, wells, water-closets and dwellings. By order of the Rural Authority these drawings are to be lithographed on several small sheets, and a copy of each requirement can be had on application by builders or others engaged on new buildings or alterations within the district. With a view of carrying out the requirements of the Authority, traps, grids, ventilators, etc., will be kept in stock, and supplied within the district only at prime cost; therefore no person can allege the often-repeated excuse that he cannot procure the necessary appliances.

RURAL WATER SUPPLY.

At a recent meeting of the Hexham Rural Sanitary Authority, it was reported that a scarcity of water, amounting almost to a famine, existed in a group of

townships on the south side of the Tyne. The chairman, Mr. J. M. Ridley, stated that an area of eighteen square miles upon that hillside was almost without water. The question has repeatedly occupied the attention of the Authority; but the unusual drought of the winter months has aggravated the case to an unexpected degree. A special committee was appointed to consider the whole subject, with especial reference to a suggested scheme for taking water from a sufficient altitude at Minsteracres, six miles west of the chief village affected. The committee was empowered to confer with Mr. John S. Hodgson, C.E., Hexham, who was at the same time instructed to collect the necessary information as to yield of springs and drainage area. The sum of £8,000 was named as the least probable cost of scheme, subject to more detailed investigation by the engineer, and the terms upon which the water rights can be acquired. The absence of a proper water supply threatens to lessen the value and efficiency of the sewerage works which this Authority is systematically laying down in the various villages.

'SUNDAYS OUT.'

In a recent report, Dr. Dudfield, the able health officer for Kensington, discusses the distribution of small-pox in his district, and points to the remarkable frequency of the instances in which a female domestic servant was the only person ill in a house. He observes that in the great majority of instances there was but one case in a house, and in a considerable number of these the single sufferer was a servant. In most of such cases, moreover, the symptoms first showed themselves on or very near Sunday, at a period when they would have been expected to develop, on the assumption that the disease had been contracted on the previous Sunday week, when the sufferer was enjoying her 'Sunday out'. In one month alone, out of a total of 27 cases—one to a house—no fewer than 12 were of female domestic servants. There certainly seems grave reason to fear that this practice of allowing servants their Sunday out not infrequently leads to the introduction from the overcrowded homes of the poor of the poison of zymotic disorders; and it is probable that searching investigation on this point would often clear up an otherwise inexplicable attack of infectious disease.

LOCAL GOVERNMENT BOARD INQUIRY AT WIGTON.

Mr. S. J. Smith, C.E., the Inspector appointed by the Local Government Board, held an inquiry at Wigton, Cumberland, on the 28th ult., into the proposed scheme of sewerage and sewage disposal for the town. The scheme was opposed by farmers and others having fields near to the proposed disposal land, on account of the damage which they believed would be caused by the works. Mr. John S. Hodgson, C.E., Hexham, the Board's Consulting Engineer, was examined by the Inspector, and stated that a total of over 5 miles of sewer, varying from 9 inches to 18 inches in diameter, was required. The ventilation would be effected by 133 open gratings at the surface of streets, etc. Means of flushing were provided by 4 inlets from streams and 41 flushing penstocks in manholes. The sewers to be in all cases below the cellar levels, and subsoil drainage pipes to be laid in portions of the town, at the same level as the sewers, and discharging into streams at suitable points. The sewers themselves to be as nearly as possible water-tight, and not to receive the rainfall off clean surfaces, for which special provision would require to be made. The estimated cost of the scheme was £6,700. The Inspector pointed out that so far from any damage arising from the works, they would in reality greatly benefit the surrounding land by lowering the level of the water now standing in the streams and cuts. He had visited the land and approved of it, as well as of the means proposed for its thorough deep drainage. The inquiry was then closed, the Inspector promising to report in due course.

AMENDMENT OF THE SANITARY ACT.

The Sunderland Local Board is seeking the co-operation of other Local Boards in urging the Local Government Board to obtain a revision of the 252nd section of the Sanitary Act, which requires that any legal proceedings for breach of building bye-laws must be taken within six months of the date of the offence being committed. Very often these offences, such as surreptitious connections with sewers, are not discovered till long after the six months have expired. An extension of time, it is urged, should be granted, or it should be made six months from the date of the discovery of the offence.

SUPERVISION OF LAUNDRIES.

The Dublin Sanitary Association have passed a resolution in favour of the adoption of certain regulations suggested by the Society of Metropolitan Medical Officers of Health. The Society is of opinion that every person who undertakes to do laundry-work for others than the actual residents of the house in which a laundry is situate should be deemed to have a public laundry, and every such laundry should be under the supervision of a medical officer of health.

SMALL-POX AT BATH.

An outbreak of small-pox at a place the sanitary defences of which should be so perfect as Bath, would be worthy of some careful study, even were the outbreak of less formidable dimensions than that which has lately afflicted the place. Some 250 cases of small-pox, with 50 deaths, is a very heavy bill to pay for a too tardy exercise of statutory powers for dealing with this terrible disease. We regret that the annual report of the medical officer of health does not give such particulars as we could desire as to the manner in which small-pox became so widespread and fatal in the city. Whilst doubts remained unsolved as to the expediency of throwing open the authority's hospital for small-pox cases, the disease was apparently creeping on insidiously; and such cases as were isolated were quite improperly sent to the workhouse hospital. In the case of small-pox, promptitude of action is of essential importance, and it seems to us that the corporation are acting most unwisely in imposing a charge of fifteen shillings a week as a condition of entering their hospital. Such a course must inevitably debar the majority of those who would be most likely to require the isolation which the hospital would afford them from making use of it; and it is particularly unfair upon such people to brand them as paupers, by sending them to the workhouse hospital because they cannot afford to pay what the corporation demand. In a health resort such as Bath, hospital accommodation ought to be free to whoever requires it. The prohibitive price too often put upon entrance to a sanitary hospital is practically to

completely nullify its advantages. It is so far satisfactory to learn that the sanitary authority has now, on the urgent representations of Dr. Mouat, of the Local Government Board, consented to take the entire responsibility of dealing with the epidemic, and have resolved to run up two double huts for the isolation of the cases; but this should have been done on the first appearance of the epidemic, and not have been left till it had become so widespread and fatal. In consequence of the tardy action of the town council, the bulk of the cases were sent for isolation to the workhouse hospital—a totally insufficient building at the best, and not adapted to receive more than the cases of infectious disease arising in the workhouse amongst the inmates; yet the vast majority of cases treated therein were city cases, which, in addition to being improperly removed thither, spread the infection amongst the workhouse inmates, through the imperfect separation of the wards from the building proper. Greater helplessness in dealing with an epidemic we have seldom seen, and the sanitary authority ought at once to set about the establishment of a properly equipped and sufficient hospital instead of their present imperfect one, if they do not wish public confidence in Bath to be lost.

SANITARY APPOINTMENT AT CYPRUS.

We have great satisfaction in announcing that Dr. Frederick W. Barry, the Medical Officer of Health for the Craven combined district in Yorkshire, has been appointed by her Majesty's Government as Principal Medical Officer of Cyprus. In this capacity he will have the supervision and organisation of registration, vaccination, medical relief, quarantine, and the general health affairs of the island. The appointment is at present only a provisional one, and it reflects great credit upon the sanitary authorities of Dr. Barry's district that they have given him, without cavil, leave of absence of six months from his duties, in order to take up the appointment. Dr. Barry is quite a young man, and although he has been at work in the Craven district barely two years, has already succeeded in securing a high reputation as a careful, cautious, and able administrator, as well as a hard worker. His selection for so responsible a post must be eminently gratifying to himself, and, taken in connection with the appointment of Mr. John Spear of South Shields to the Medical Department of the Local Government Board, may help to console medical officers of health with the conviction that they are not utterly overlooked by the 'powers that be'.

PIGS AT CHELTENHAM.

There has been another battle of the pigs at Cheltenham. For the last six years the energetic Officer of Health, Dr. Wright, F.R.S., has been inveighing against the practice of allowing pigs to exist in the town without any prohibition as to distance between them and dwelling houses, although the nuisance arising from them has been loudly complained of. At last Dr. Thorne Thorne was sent down to confer with the town council as to the details of certain bye-laws which they had submitted to the Local Government Board; and in the course of his inspection of the town he expressed—as well he might—his great surprise at the bad state of the pigsties and slaughter-houses there. He gave a very decided opinion as to the extent and mischief of the pig nuisance in Cheltenham, and expressed a hope that the council would name such a distance clause in their bye-laws on the subject as would assist in remedying a nuisance so long and often complained of, which was most injurious to the character of a great health resort like Cheltenham, and which was as bad there as in some places in the Black Country. Acting upon this opinion, the Public Health Committee resolved to submit to the council that no pigs should be kept within 60 feet of a dwelling house—a distance all too short in a place like Cheltenham. But in the town council there is a strong party against the appointment of any distance at all, and this party carried the day, by passing an amendment omitting the distance clause. Thus, for purely obstructive reasons, Cheltenham is still to be exposed in its most populous and crowded parts to the noisome nuisance of pig-keeping. A great deal of nonsense was talked about the hardship of such a bye-law to the poor; but the medical officer of health, whose efforts to get such a bye-law have been unceasing, has already shown this argument to be untenable. Of 1,000 pigs, he found only 41 kept by cottagers, the great majority being kept by butchers and dealers. Out of the 1,000 pigs, against which complaints had been made within a specified period, 728 belonged to these classes, and were kept in the midst of the populous districts of the borough for trade purposes only. The argument of the 'poor man's pig' therefore falls to the ground. It is a pity that there is no power to compel the appointment of a proper distance between pigsties and dwelling houses.

DIPHTHERIA AND WATER.

Dr. Sandford, Medical Officer of Health for Herefordshire, has investigated an outbreak of diphtheria at a place called Little Marcle, which seems *prima facie* to have been connected with impure water. At the public school, which is well built, fairly ventilated, and clean, the privies of both the girls' and boys' schools empty into one cesspool. The water supplied to the children from a well in the playground came under suspicion, and on examination it was found that a direct channel to the well had been formed by the bursting of the cesspool, and that the sewage flowed continuously into the well. Thus through the hottest months of an intensely hot summer the children had been drinking water highly charged with their own excreta, and it is not unreasonable to suppose that the epidemic may have been spread in this way.

THE PUBLIC HEALTH

DURING FEBRUARY 1880.

The temperature during February was for the most part above the average; indeed, if we except four days at the beginning of the month, and four days from 22nd to 25th inclusive, the mean temperature showed an almost constant excess. The mean temperature of the month at the Royal Observatory, Greenwich, was 41°.8, and exceeded by 2°.7 the average February temperature in 100 years. Notwithstanding this excess of temperature, the severely cold weather that prevailed during the greater part of January caused an exceptionally high recorded death-rate from diseases of the respiratory organs during the earlier part of February. Rain was measured at Greenwich on 17 of the 29 days of the month to the aggregate amount of 2.3 inches; this amount exceeded by 0.8 of an inch the average February rainfall during 61 years. The sun was above the horizon 278 hours during the month, but only

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF FEBRUARY 1880.

Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
ABINGDON	6,033	17	12	5	1	..	..	1	5	1	..	..	..	..	..	..	1	1	..	1	..	35.5	25.1	2.1	2.1	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	92	47	14	9	1	2	12	9	3	..	1	..	..	..	2	..	12	1	2	..	38.6	19.7	1.3	5.0	J. Ewart.
ACTON†	14,000	50	23	9	3	..	..	6	5	1	..	..	1	..	..	..	..	8	1	1	..	46.6	21.4	0.9	7.4	T. Francis.
ALTRINCHAM	12,000	34	20	4	3	4	..	6	3	5	..	..	1	..	4	..	..	2	..	..	..	35.7	21.0	5.2	2.1	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	85	86	17	13	6	3	23	24	15	..	3	1	1	6	2	2	21	25	..	12	32.0	32.4	5.6	7.9	W. H. Hughes.
ASTON MANOR	52,821	153	76	27	10	4	2	23	10	8	..	..	2	1	4	1	..	20	4	..	..	36.5	18.1	1.9	4.8	H. May.
BANBURY†	13,500	*	20	4	..	4	1	2	9	3	..	..	2	..	..	..	1	4	2	..	..	*	19.3	2.9	3.9	R. Grimbly.
BANGOR	7,835	*	29	5	9	2	1	5	7	13	..	12	1	..	..	..	..	3	5	..	..	*	46.5	20.9	4.8	H. Rees.
BARNSLEY	30,000	73	57	17	11	*	*	*	5	10	..	..	8	..	..	..	2	14	8	1	7	30.6	23.9	4.2	5.9	M. T. Sadler, M.D. Lond.
BARROW-IN-FURNESS	40,000	139	59	21	8	10	4	9	7	6	..	..	3	..	1	2	..	16	4	..	..	43.7	18.6	1.9	5.0	J. Settle.
BATH†	53,649	107	141	23	15	5	9	25	64	21	15	3	..	2	1	..	..	28	6	..	22	26.0	34.3	5.1	6.8	A. B. Brabazon, M.D.
BATLEY	29,851	64	48	17	12	2	3	6	8	10	..	6	1	..	2	1	..	10	1	..	..	27.0	20.2	4.2	4.2	W. Bayldon.
BECCLES	5,000	12	6	3	..	..	1	1	1	..	..	..	..	..	..	..	..	*	3	..	..	30.2	15.1	0.0	0.0	E. B. Crowfoot, M.B.
BILSTON‡	25,000	*	72	22	17	3	..	15	15	10	..	2	5	2	..	1	..	*	*	..	..	*	30.0	4.2	*	W. M. Hancox.
BINGLEY	9,000	20	22	5	7	2	1	3	4	5	..	4	1	..	..	..	..	5	1	..	..	28.0	30.8	7.0	7.0	J. W. Craig, M.D.
BIRMINGHAM†	394,738	1210	659	169	94	23	33	195	145	54	..	9	5	2	22	4	12	171	74	27	81	40.0	21.8	1.8	5.6	A. Hill, M.D.
BISHOP STORTFORD	7,024	*	19	2	2	2	2	4	7	..	..	..	..	..	..	..	..	9	..	..	2	*	34.1	0.0	16.1	W. Ogle, M.D.
BOLTON†	105,000	344	175	58	27	13	9	40	28	24	..	7	6	..	5	1	5	43	17	2	..	42.7	21.7	3.0	5.3	E. Serjeant.
BOOTLE-CUM-LINACRE†	26,500	*	38	12	12	2	..	10	2	5	..	1	2	1	1	..	..	12	1	3	1	*	18.7	2.5	8.9	R. J. Sprakeling.
BOSTON†	15,000	32	37	17	..	2	..	6	12	1	..	..	..	1	..	..	..	13	1	..	3	27.8	32.1	0.9	11.3	W. Clegg.
BRADFORD†	197,196	453	339	63	74	23	18	105	56	48	..	9	26	2	11	..	3	63	36	5	28	29.9	22.4	3.2	4.2	H. Butterfield.
BRIDGNORTH	6,000	10	12	3	1	..	..	3	5	..	..	..	..	..	..	..	..	3	..	2	1	21.0	25.2	0.0	6.3	A. Mathias.
BRIDGWATER	13,000	34	27	4	4	1	..	10	8	5	..	1	..	1	2	..	1	10	..	1	7	32.9	26.1	4.8	9.7	F. J. C. Parsons.
BRIDPORT	8,145	16	15	2	1	..	..	6	6	1	..	..	1	..	..	..	..	5	1	..	3	24.7	23.2	1.5	7.7	G. M. Evans.
BRIGHTON†	107,321	227	153	34	*	*	*	*	59	21	..	1	8	..	11	1	..	*	*	2	21	27.6	18.6	2.6	*	R. P. R. Taaffe, M.D.
BROMLEY (KENT)†	14,293	33	18	3	3	2	1	1	2	1	..	1	..	..	..	..	..	2	1	..	..	30.1	16.4	0.9	1.8	C. O. Baylis, M.D.
BRISTOL†	213,536	570	404	77	*	*	*	*	114	53	..	9	21	1	15	4	3	*	*	15	69	34.8	24.7	3.2	*	D. Davies.
BROMSGROVE	6,967	12	11	1	2	1	1	1	5	1	..	..	..	..	..	..	1	2	..	..	2	21.7	19.9	1.8	3.6	C. Carey.
BURSLEM	29,159	78	50	15	12	4	2	11	6	3	..	..	..	..	..	1	2	15	2	3	..	33.7	21.6	1.3	6.5	J. M. Taylor.
BURTON-UPON-TRENT	33,000	109	50	6	11	8	1	12	12	15	..	..	14	..	..	..	1	10	5	1	5	41.6	19.1	5.7	3.8	C. Perks.
BURY	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. Ashworth
BURY ST. EDMUNDS	15,600	38	23	5	4	..	1	3	10	..	..	..	..	..	..	..	..	9	1	..	2	30.7	18.6	0.0	7.3	F. W. Clark.
CAMBORNE	15,000	*	49	14	13	1	2	7	12	15	..	..	..	..	14	1	..	12	4	2	..	*	41.1	12.6	10.1	E. S. Angove.
CAMBRIDGE	34,500	93	60	14	7	3	2	12	22	3	..	..	..	..	2	..	1	14	6	1	7	33.9	21.9	1.1	5.1	B. Anningson, M.D.
CANTERBURY	20,962	78	61	12	5	1	4	13	26	3	..	..	2	..	..	1	..	20	4	2	11	38.8	30.3	1.5	10.0	F. Wacher.
CARDIFF	82,364	256	159	52	31	9	7	45	15	31	..	10	4	2	13	1	1	44	10	14	17	39.1	24.3	4.7	6.7	H. J. Paine, M.D.
CARNARVON	10,407	34	16	5	3	1	1	4	2	..	..	..	..	..	..	..	..	4	2	..	..	41.1	19.3	0.0	4.8	H. Rees.
CHELMSFORD	9,700	22	8	2	..	..	..	3	3	..	..	..	..	..	..	..	..	3	1	..	1	28.5	10.4	0.0	3.9	E. H. Carter.
CHELTENHAM	45,000	90	69	17	2	2	3	16	29	2	..	..	..	..	..	1	1	14	4	..	6	25.2	19.3	0.6	3.9	T. Wright, M.D.
CHISWICK	12,000	44	13	4	2	1	..	1	3	1	..	..	..	..	1	..	..	6	..	..	..	46.2	13.6	1.0	6.3	F. C. Dodsworth
COLCHESTER	28,633	59	63	8	6	1	2	20	26	1	..	..	..	..	..	1	..	19	3	1	15	25.9	27.7	0.4	8.4	E. Waylen.
CONGLETON	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	P. M. Davidson.
COSELEY	23,000	49	42	10	7	2	3	8	12	7	..	6	..	..	..	1	..	12	2	2	..	26.8	23.0	3.8	6.6	J. Eagleton.
COVENTRY†	41,000	125	59	11	7	3	4	8	26	6	..	..	4	1	..	..	1	10	4	..	5	39.7	18.8	1.9	3.2	M. A. Fenton, M.D.
CROYDON	70,000	185	123	26	15	14	4	24	40	19	..	2	10	2	3	2	..	30	15	3	12	33.3	22.1	3.4	5.4	C. W. Philpot, M.D., B.Sc.
DARTFORD	9,531	24	16	2	3	..	1	3	7	2	..	1	..	..	1	..	..	2	..	..	7	31.7	21.1	2.6	2.6	E. Moore.
DERBY†	80,385	226	134	30	28	9	12	25	30	17	..	1	12	..	..	..	..	23	15	9	16	36.6	21.7	2.8	3.7	W. Iliffe.
DEVONPORT	50,000	112	102	16	33	6	3	17	27	33	..	27	..	..	4	2	..	23	2	1	7	28.2	25.7	8.3	5.8	J. May, jun.
DORCHESTER	7,500	21	15	6	1	..	1	1	6	..	..	..	..	..	..	..	..	5	2	..	..	35.2	25.2	0.0	8.4	E. J. Day.
DOVER	33,636	93	60	21	7	..	3	13	16	1	..	..	..	..	1	..	..	30	3	3	5	34.8	22.5	0.4	11.2	M. K. Robinson, M.D.
DROITWICH†	3,600	13	5	1	..	..	..	1	3	..	..	..	..	..	..	..	..	1	..	..	1	47.1	18.1	0.0	3.6	H. Swete, M.D.
EASTBOURNE	18,000	*	22	8	1	..	3	6	4	2	..	..	1	..	1	..	..	5	1	..	6	*	15.4	1.4	3.5	E. F. Fussell, M.B.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF FEBRUARY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged					Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
East Dereham	5,791	14	7	3	2	..	..	2	2	1	..	1	..	..	..	..	..	..	..	..	30.4	15.2	2.2	0.0	H. B. Vincent.
Fenton	14,000	41	27	6	8	..	..	5	5	4	..	..	4	..	..	..	..	3	4	..	36.9	24.3	3.6	2.7	A. V. Griffiths.
Finchley†	11,389	21	14	2	0	..	1	2	5	3	..	..	..	..	1	..	2	3	4	..	24.0	16.0	3.4	3.4	J. Turle, M.D.
Glossop†	18,815	33	36	2	6	5	..	7	10	2	..	..	..	..	..	..	..	10	5	3	22.9	24.9	1.4	6.9	J. Rhodes.
Gloucester	37,907	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. P. Wilton.
Goole	10,205	34	17	3	3	..	2	4	5	3	..	1	1	..	..	1	..	5	..	1	41.9	21.0	3.7	6.2	J. Mitchell Wilson, M.B.
Gorton†	32,000	87	71	16	21	8	3	16	7	17	..	1	14	1	1	..	..	16	6	..	35.4	28.9	6.9	6.5	R. E. Hammond.
Great Driffield	6,033	15	10	1	1	..	1	4	3	..	..	..	..	..	..	..	..	5	..	2	31.3	20.9	0.0	10.4	D. Ridpath, M.D.
Guildford	10,167	18	20	8	2	..	..	7	2	1	..	..	..	..	..	..	1	7	2	..	22.3	24.8	1.2	8.7	J. Morton, M.D.
Halifax†	72,000	166	143	25	27	*	*	*	30	17	..	..	12	..	..	5	..	24	15	1	16	30.1	25.9	3.1	4.4	D. Ainley.
Heywood	23,000	*	53	10	8	2	5	13	15	4	..	..	..	..	..	3	..	20	3	1	..	*	29.0	2.2	10.9	H. Wisken.
Hinckley	7,500	25	18	9	1	..	..	3	5	1	..	..	..	..	1	..	..	4	2	..	..	41.9	30.2	1.7	6.7	W. H. Griffiths.
Hindley	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Horwich	4,315	6	5	2	1	..	..	1	1	1	..	1	..	..	..	..	..	1	..	..	17.5	14.6	2.9	2.9	G. H. Whitaker.
Huddersfield†	81,780	177	134	31	21	5	6	39	32	3	..	..	2	..	..	1	..	34	19	3	19	28.2	21.4	0.5	5.4	J. S. Cameron, M.D., B.Sc.
Hull†	149,627	437	311	107	63	12	10	67	52	64	..	39	3	..	15	4	3	45	30	13	39	38.1	27.1	5.6	3.9	J. F. Holden.
Hyde	28,420	104	69	21	6	6	6	..	30	8	..	..	5	..	..	1	1	19	3	..	..	46.1	30.6	3.5	8.4	J. Nield Cooper.
Ilfracombe	5,350	15	5	2	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	35.3	11.8	0.0	0.0	E. J. Slade-King, M.D.
Ilkeston†	12,356	44	24	10	2	1	2	5	4	3	..	..	..	..	..	..	..	3	5	..	..	46.4	25.3	3.2	5.3	R. Wood.
Ipswich	47,414	120	111	28	17	2	2	28	34	12	..	..	..	1	10	..	1	34	9	1	10	33.0	30.5	3.3	9.3	G. S. Elliston.
Jarrow	22,500	75	37	11	10	3	2	5	6	12	..	3	2	..	6	1	..	9	3	1	..	41.9	20.7	6.7	5.0	J. Spear.
Keighley	24,000	73	47	14	11	2	5	4	11	4	..	1	2	..	..	..	1	14	4	..	3	38.3	24.6	2.1	7.3	A. Roberts.
Leamington	24,500	41	37	5	10	1	1	10	10	4	..	..	3	..	..	..	1	5	1	..	4	28.1	19.0	2.1	2.6	J. S. Baly.
Leeds†	318,929	838	520	121	71	*	*	*	133	35	..	9	12	1	3	6	4	143	48	*	*	34.3	21.3	1.4	5.8	G. Goldie.
Leek	12,527	40	36	7	9	3	1	11	5	1	..	..	..	..	..	1	..	8	5	1	..	40.2	36.2	1.0	8.0	J. J. Ritchie.
Leicester†	129,912	375	200	65	24	*	*	*	43	23	..	7	4	1	4	2	5	*	7	21		37.7	20.1	2.3	*	W. Johnston, M.D.
Leigh	20,400	58	44	12	10	3	5	6	8	6	..	..	4	..	2	..	..	1	4	2	..	35.8	27.1	3.7	0.6	J. Hall.
Lichfield	8,129	15	6	2	..	..	..	3	1	..	..	..	..	..	..	..	1	1	2	..	..	23.2	9.3	0.0	1.5	G. A. Carter, M.D.
Lincoln†	32,103	88	53	9	6	1	3	14	20	3	..	..	1	..	..	2	..	9	7	..	7	35.7	21.5	1.2	3.7	C. Harrison, M.D.
Littlehampton	4,000	9	5	1	1	..	1	1	1	..	..	..	..	..	..	..	..	2	2	..	..	28.3	15.7	0.0	6.3	C. Kelly, M.D.
Liverpool†	544,056	1566	1137	241	222	76	56	344	198	136	..	34	36	10	36	13	7	335	112	45	170	37.5	27.2	3.3	8.0	J. S. Taylor, M.D.
Liversedge	13,750	25	21	4	7	1	1	6	2	4	..	3	..	..	..	1	..	3	..	..	..	22.9	19.2	3.7	2.7	W. J. Sykes, M.D.
Luton	24,200	52	54	13	17	3	2	7	12	17	..	1	..	..	13	2	1	7	5	..	8	27.0	28.1	8.8	3.6	H. Sworder.
Lytham	5,000	11	9	1	..	..	3	..	5	1	..	..	..	..	..	1	..	1	1	..	1	27.7	22.7	2.5	2.5	W. E. Pountney, M.B.
Macclesfield	36,641	90	76	18	6	6	1	21	24	2	..	..	..	..	1	1	..	12	12	1	11	30.9	26.1	0.7	4.1	G. Bland.
Maidenhead	8,281	17	17	1	1	2	1	7	5	1	..	..	..	..	..	1	..	3	3	..	6	25.8	25.8	1.6	4.6	W. T. G. Woodforde, M.D.
Maidstone†	29,537	62	74	19	15	6	1	14	19	8	..	2	..	..	4	1	..	23	3	..	1	27.4	32.7	3.5	10.2	M. A. Adams.
Manchester†	363,130	1079	754	156	*	*	*	*	149	89	..	11	22	3	38	5	10	*	30	26	156	38.8	27.1	3.2	*	J. Leigh.
Merthyr Tydfil	52,000	114	77	18	10	8	2	19	20	5	..	1	..	..	3	..	1	20	6	1	3	27.6	18.6	1.2	4.8	T. J. Dyke.
Middlesbrough	53,580	159	79	24	15	9	1	19	11	10	..	..	7	..	2	1	..	25	5	2	4	37.4	18.6	2.3	5.9	J. A. Malcomson, M.D.
Middleton and Tonge†	16,700	44	21	6	2	2	1	3	7	2	..	1	..	..	1	..	..	4	1	..	..	34.3	16.4	1.6	3.1	T. B. Knott.
Morley	12,100	44	33	12	7	1	1	4	8	2	..	1	..	..	..	..	1	11	1	..	..	45.8	34.3	2.1	11.4	S. T. Steele.
Neath†	12,000	22	21	5	..	2	3	5	6	2	..	..	2	..	..	..	..	4	3	1	2	23.9	22.8	2.2	4.3	G. Ryding, M.D.
Newark†	13,746	40	27	4	3	2	2	7	9	..	..	..	..	..	..	..	..	10	1	1	1	38.0	25.6	0.0	9.5	A. Ashby, M.B.
Newbury	9,796	29	24	5	..	1	..	11	7	..	..	..	..	..	..	..	..	7	1	..	5	37.3	30.8	0.0	9.0	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	49	25	3	4	3	1	10	2	2	..	..	..	..	2	..	..	..	4	..	..	33.1	16.9	1.4	0.0	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	419	272	61	56	*	*	*	47	35	..	..	10	1	21	2	1	56	32	..	32	36.6	23.7	3.1	4.9	H. E. Armstrong.
Norwich†	85,827	228	186	45	*	*	*	*	48	20	..	..	10	1	4	4	1	*	*	7	14	34.7	28.3	3.0	*	T. W. Crosse.
Nottingham†	173,627	485	419	107	119	18	12	77	86	94	..	65	12	1	6	4	6	98	26	12	24	36.4	31.5	7.1	7.4	E. Seaton, M.D.
Nuneaton	7,400	22	28	7	8	..	1	4	8	2	..	..	..	..	1	1	..	17	..	2	..	37.4	47.6	3.4	28.9	E. Peacock.
Oakworth†	6,000	10	12	4	2	..	..	4	2	..	..	..	..	..	..	..	..	4	2	..	..	21.7	26.1	0.0	8.7	F. W. Barry, M.D.
Oldham†	115,413	305	203	49	49	9	14	48	34	19	..	6	..	2	5	3	3	71	21	1	14	34.4	22.9	2.1	8.0	J. M. Sutton, M.D.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27

Penzance	12,000	30	26	9	3	1	..	0	7	3	..	..	..	1	..	1	1	0	..	1	..	31.5	27.3	3.1	0.3	S. D. Millett.
Peterborough†	22,000	59	33	5	5	4	2	6	11	3	..	..	1	..	2	..	..	9	4	1	1	35.0	19.5	1.8	5.3	W. Thomson, M.D.
Plymouth†	74,993	190	182	39	57	10	14	26	36	47	..	36	..	2	8	..	1	42	11	1	8	33.0	31.6	8.2	7.3	H. Greenway.
Poole	11,530	30	31	10	4	2	..	3	12	..	..	..	..	..	..	..	..	11	1	..	2	32.8	33.8	0.0	12.0	H. A. Lawton.
Portsmouth	134,224	335	220	55	36	5	13	57	60	10	..	2	1	..	3	2	2	78	22	7	20	31.4	20.6	0.9	7.3	G. Turner.
Preston†	88,000	327	197	50	27	12	9	67	32	9	..	..	4	1	..	..	4	49	15	9	9	48.4	29.2	1.3	7.3	H. O. Pilkington.
Ramsgate	22,200	50	47	7	8	3	2	11	16	8	..	..	5	..	3	..	..	7	3	3	2	28.3	25.5	4.5	4.0	J. W. Barry.
Reading	41,500	99	104	33	23	3	4	17	27	6	..	..	..	..	4	..	2	50	6	3	12	30.0	31.5	1.8	15. 2	J. Shea, M.D.
Redditch	10,070	30	18	8	2	..	1	2	5	1	..	..	..	..	..	1	..	9	2	1	..	37.5	22.5	1.3	11. 3	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	16	17	4	1	..	1	4	7	..	..	..	..	..	..	..	..	4	2	..	..	21.2	22.5	0.0	5.3	J. S. Hichens.
Reigate..	18,000	36	29	9	3	2	..	4	11	..	..	..	..	..	..	..	..	12	..	1	..	25.2	20.3	0.0	8.4	E. L. Jacob.
Richmond (Surrey)†	19,500	48	46	10	3	1	..	10	22	7	..	..	1	..	5	1	..	20	1	1	9	32.1	30.7	4.7	13.4	J. T. Rowland, M.D.
Rochdale	72,000	178	122	35	29	5	3	29	21	24	..	13	3	1	1	6	..	25	10	2	..	31.1	21.3	4.2	4.4	J. Henry, M.D.
Rochester	18,500	53	70	13	20	6	..	18	13	15	1	2	1	..	10	1	..	24	5	2	12	36.1	47.6	10. 2	16. 3	J. Sladen-Knight, M.D.
Romsey..	4,481	13	10	2	..	..	1	1	6	..	..	..	..	..	..	..	..	3	2	..	..	36.5	28.1	0.0	8.4	F. Buckell.
Rotherham†	34,404	101	50	*	*	*	*	*	*	1	..	1	..	..	..	..	..	..	..	..	1	38.3	18.9	3.8	0.0	J. Hardwicke, M.D.
Rowley Regis..	27,000	88	52	24	12	2	1	7	6	5	..	2	2	..	..	1	..	12	..	1	..	41.0	24.2	2.3	5.6	J. G. Beasley.
Rugby	8,916	22	22	8	3	..	1	4	6	5	..	..	..	..	5	..	..	6	1	2	2	31.1	31.1	7.1	8.5	G. Wilson, M.D.
Runcorn	14,000	51	14	4	1	2	..	4	3	..	..	..	..	..	..	..	..	3	1	1	..	45.9	12.6	0.0	2.7	R. H. Mouritz.
Rusholme†	12,500	21	11	1	2	1	2	2	3	1	..	..	..	..	1	..	..	1	1	..	..	21.9	11.5	1.0	1.0	J. Gregory.
Ryde	12,800	*	30	7	1	..	1	8	13	..	..	..	..	..	..	..	..	18	1	..	2	*	29.5	0.0	1.8	A. Platt Wilks, M.B.
Salford†	185,786	564	348	98	73	23	11	92	51	63	..	3	11	1	33	9	6	86	40	11	36	39.6	24.4	4.4	6.0	J.Tatham, M.D.,S.Sc.C.Camb.
Selby	6,193	14	11	1	2	..	..	1	7	1	..	1	..	..	..	..	..	..	..	..	2	28.5	22.4	2.0	0.0	J. Mitchell Wilson, M.B.
Sheffield†	304,938	763	505	97	118	*	*	*	83	94	..	9	34	..	18	25	8	131	6	5	76	32.6	21.6	4.0	5.6	T. W. Hime, M.B.
Sittingbourne‡	9,000	32	15	8	2	..	..	2	3	..	..	..	..	..	..	..	..	3	1	..	..	37.1	17.4	0.0	3.5	H. G. Sutton.
Skipton†	9,500	29	20	3	7	..	..	7	3	1	..	1	..	..	..	..	..	6	2	..	5	39.8	27.4	1.4	8.2	F. W. Barry, M. D.
Smethwick	21,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	W. Sutton.
Southport	34,100	61	57	11	7	3	2	14	20	7	..	..	..	..	1	6	..	18	6	1	2	22.5	21.0§	2.6	6.6	H. H. Vernon, M.D.
South Shields†	62,000	195	111	27	29	14	6	19	16	19	..	2	11	1	2	2	1	22	6	8	..	41.0	23.3	4.0	4.6	J. Spear.
Stalybridge	23,124	62	39	9	11	2	3	10	4	5	..	4	..	..	1	..	..	6	3	..	..	33.8	21.2	2.7	3.3	F. J. Roberts-Dudley.
Stourbridge	9,376	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	R. S. T. Eagar, M.D.
Stratford-on-Avon..	7,899	*	10	3	..	..	1	..	6	1	..	..	..	..	1	..	..	2	1	..	1	*	15.9	1.6	3.2	G. H. Fosbroke, jun.
Stroud	7,665	22	20	7	..	..	1	6	6	..	..	..	..	..	..	..	..	5	..	1	3	36.1	32.8	0.0	8.2	T. Partridge.
Sunderland†	116,730	316	208	53	48	12	9	46	40	41	..	2	28	..	8	1	2	36	11	8	22	35.3	23.2	4.6	4.0	H. J. Yeld, M.D.
Swansea	65,890	188	118	22	40	5	6	22	23	32	..	3	26	..	..	3	..	21	12	3	6	35.9	22.5	6.1	4.0	E. Davies.
Swinton	7,753	22	16	7	5	..	1	3	..	2	..	..	..	..	2	..	..	5	2	..	..	35.7	26.0	3.2	8.1	C. S. Blythman, M.B.
Tamworth	4,846	15	7	1	1	1	1	1	2	2	..	..	2	..	..	..	..	1	2	..	..	39.0	18.2	5.2	2.6	H. J. Fausset, M.D.
Taunton	16,227	51	30	8	1	2	3	8	8	1	..	..	..	..	..	..	1	3	3	..	9	39.6	23.3	0.8	2.3	H. J. Alford, M.D.
Teignmouth	7,000	13	17	4	4	..	..	1	8	5	..	..	..	..	5	..	..	5	1	..	..	23.4	30.6	9.0	9.0	W. C. Lake, M.D.
Tewkesbury	5,500	12	10	2	1	..	..	1	6	..	..	..	..	..	..	..	..	1	..	2	1	27.5	22.9	0.0	2.3	W. Allard.
Tiverton	10,400	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. P McNeill, M.D.
Torquay	26,000	*	49	14	6	2	3	11	13	3	..	..	..	..	3	..	..	14	7	..	2	*	23.7	1.5	6.8	P. Q. Karkeek.
Tottenham	37,000	121	65	16	13	1	1	10	24	2	..	1	1	..	..	..	..	22	1	1	4	42.5	22.7	0.7	7.7	C. T. Conolly.
Toxteth Park†	8,000	27	10	3	2	1	..	2	2	2	..	..	1	..	..	1	..	5	1	..	..	44.0	16.3	3.3	8.1	R. W. Pendleton.
Tredegar	18,000	49	45	8	9	3	2	4	19	8	..	..	3	..	5	..	..	13	1	2	5	34.3	31.5	5.6	9.1	G. A. Brown.
Trowbridge	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. C. Tayler, M.D.
Truro	11,000	32	15	5	2	1	..	2	5	..	..	..	..	..	..	..	..	5	1	..	..	36.6	17.2	0.0	5.7	E. Sharp.
Tunstall†	15,300	44	22	7	4	1	..	6	4	..	..	..	..	..	..	..	..	6	..	..	..	37.5	18.7	0.0	5.1	J. P. Edwards.
Ulverston	11,000	32	14	3	1	1	..	..	8	..	..	..	..	..	..	..	..	4	2	..	..	36.6	16.0	0.0	4.6	A. Thompson, M.D.
Walker-on-Tyne	8,000	23	8	2	1	1	..	4	..	1	..	..	..	1	..	..	.	2	1	2	1	36.2	12.6	1.6	3.1	H. F. Hurst.
Wallasey†	20,000	45	34	7	3	3	3	6	12	..	..	..	..	..	..	..	..	8	4	1	1	29.3	22.2	0.0	5.2	I. Byerley.
Warrington†	40,000	163	77	27	14	5	4	12	15	4	..	..	..	..	1	2	1	17	5	5	8	53.1	25.1	1.3	5.5	G. W. Joseph.
Wednesbury†	26,000	73	27	8	4	1	..	7	7	3	..	1	1	..	1	..	..	9	2	..	..	36.6	13.5	1.5	4.5	J. C. Garman.
West Bromwich†	54,000	199	109	34	20	*	*	*	23	11	..	7	2	..	..	..	2	*	..	8	10	48.0	26.3	2.7	*	J. Manley.
West Derby	33,693	91	39	4	..	3	4	16	12	2	..	1	1	..	..	..	..	6	7	..	..	34.0	14.6	0.7	2.2	W. Carter, M.B.
Weymouth	15,269	25	25	6	1	..	2	6	10	..	..	..	..	..	..	..	..	7	2	..	6	20.6	20.6	0.0	5.8	H. Tizard, M.D.
Widnes	22,000	64	37	7	15	1	2	10	2	3	..	..	1	1	1	..	..	15	4	1	1	36.6	21.2	1.7	8.6	W. Cooper.
Willenhall†	19,300	55	21	6	3	1	1	4	6	4	..	..	..	1	1	..	2	4	..	..	..	37.1	14.2	2.7	2.7	W. H. Hartill.
Withington‡	15,000	24	12	..	1	1	..	6	4	1	..	..	1	..	..	..	..	3	2	..	..	20.9	10.4	0.9	2.6	T. C. Railton, M.B.
Wolverhampton†	76,000	221	111	23	20	1	3	32	32	9	..	..	1	..	4	..	4	33	5	7	23	37.9	19.0	1.5	5.7	J. H. Love.
Workington†	10,000	*	23	2	7	1	1	4	8	4	..	4	..	..	..	..	..	8	..	2	..	*	30.0	5.2	10. 4	J. Ward, M.D.
Worthing	9,540	24	12	2	4	2	..	1	3	4	..	..	..	1	3	..	..	3	3	..	..	31.7	15.9	5.3	4.0	C. Kelly, M.D.
York	46,850	127	88	22	18	4	7	16	21	7	..	3	1	..	1	1	1	17	8	3	9	28.3	23.6	1.9	4.6	S. W. North.
Ystradyfodwg	52,000	144	80	33	18	..	5	14	10	5	..	..	..	2	2	1	..	29	5	3	..	34.8	19.4	1.2	7.0	W. Rhys.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

§ The death-rate, exclusive of the deaths of moribund visitors, was 19.6.

56.2 hours of bright sunshine were recorded at Greenwich; this amount, however, considerably exceeded the hours of sunshine during February 1878 and 1879, when but 32.9 and 31.7 hours, respectively, were recorded.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, and containing a population of seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 21,377 births and 16,697 deaths were registered during the four weeks ending 27th February last. The births were equal to an annual rate of 37.2 persons of the estimated population in the twenty towns; the birth-rate was equal to 38.4 in London, and to 36.0 in the aggregate of the nineteen provincial towns. The deaths registered in the four weeks of February were equal to an annual rate of 29.0 per 1,000, against 23.7, 29.0, and 26.0 in the preceding November, December, and January. The February death-rates in those towns in 1877, 1878, and 1879 were equal to 22.7, 26.3, and 26.4 per 1,000, respectively.

The lowest annual rate of mortality during February in the twenty towns was 18.6 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follows:—Wolverhampton, 19.1; Leicester, 20.1; Sheffield, 21.2; Leeds, 21.3; Birmingham, 21.8; Portsmouth, 22.1; Bradford, 22.4; Oldham, 22.9; Sunderland, 23.2; Newcastle-upon-Tyne, 23.8; Salford, 24.4; Bristol, 24.7; Manchester, 27.1; Liverpool, 27.3; Hull, 27.9; Norwich, 28.3; Nottingham, 28.5; Plymouth, 31.7; and the highest rate during the month 34.0 in London. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate in February averaged but 24.3 per 1,000, whereas it was equal to 34.0 in London. The mortality in London, therefore, exceeded that in the nineteen provincial towns by 40 per cent., and the deaths would have been fewer by 2,807 if the death-rate in the metropolis had been the same as that in the nineteen towns. The high death-rates in Hull, Nottingham, and Plymouth were mainly due to the excessive fatality of measles.

The 16,697 deaths from all causes in the twenty towns last quarter included 2,250 which were referred to the seven principal zymotic diseases; 1,021 resulted from whooping-cough, 468 from scarlet fever, 338 from measles, 173 from fever (principally enteric), 133 from diarrhœa, 66 from diphtheria, and 51 from small-pox. These 2,250 deaths were equal to an annual rate of 3.9 per 1,000 in the twenty towns during the four weeks under notice, against 4.1 and 3.8 in the two preceding months. In the nineteen provincial towns the zymotic rate was 3.3 per 1,000, while in London it was equal to 4.6. The death-rate from these diseases last month did not exceed 1.0 in Portsmouth, and 1.5 in Wolverhampton and Leeds; it ranged upwards, however, to 5.8 in Hull, 6.8 in Nottingham, and 7.7 in Plymouth. Whooping-cough was again the most fatal zymotic disease in these towns during the month, causing 751 deaths in London, and but 270 in the provincial towns. The fatal cases of this disease were also excessive in Salford and Newcastle-upon-Tyne. The fatality of scarlet-fever was proportionally largest in Norwich, Bristol, Bradford, Sheffield, and Sunderland. Measles continued to show epidemic fatality in Plymouth, Nottingham, and Hull; only 93 deaths from this disease occurred in London during February, whereas 245 fatal cases were recorded in the nineteen provincial towns. The fatality of fever (principally enteric) was rather less in London than in the aggregate of the provincial towns; 27 deaths were referred to this disease in Sheffield during the four weeks of February. The 66 deaths from diphtheria in the twenty towns were slightly below the number returned in January; 35 occurred in London, and 10 in Liverpool. All the 51 fatal cases of small-pox were registered in London, not a single death from this disease being recorded in any of the nineteen provincial towns. Small-pox showed increased prevalence and fatality in London during February, and the metropolitan asylum hospitals contained 163 patients at the end of the month, against but 80 at the end of January. The weekly number of new cases of small-pox admitted to these hospitals during February averaged 50 per week, against 11 and 20 in December and January.

The low temperature, which was maintained until the end of January, caused a considerable excess in the fatality of diseases of the respiratory organs during the early part of February. The weekly number of deaths referred to these diseases in London, which had been 470, 702, and 571 in November, December, and January, rose in February to 932, the weekly numbers during which month were 1,557, 1020, 693, and 459; the average annual death-rate from these diseases during February was equal to 13.3 per 1,000. The death-rate from diseases of the respiratory organs, in those of the twenty towns furnishing returns, ranged from 3.9 and 4.0 in Hull and Sunderland, to 8.0 in Liverpool and Oldham, and 13.3 in London.

In the outer ring of suburban districts around London (having a population little short of a million of persons), the annual death-rate from all causes during February did not exceed 21.2, and the zymotic rate was but 2.0 per 1,000. In inner or registration London the corresponding rates were, as before stated, equal to 34.0 and 4.6 per 1,000, respectively.

The accompanying table of mortality statistics for February includes uniform information for 162 urban sanitary districts. In the corresponding tables for the seven preceding months, the number of contributing sanitary districts steadily increased from 36 to 151. On the last day of January, 183 post cards were sent out to the medical officers of as many urban sanitary districts, including 17 new applications; of these 183 cards, no less than 162 have been returned with the requested information, which is herewith published. Only five of the seventeen new applications have at present had a successful result, but we have received further promises of co-operation in future, and are thus able to hope for a continuance of the hitherto steady increase in the number of sanitary districts for which we are able to publish uniform monthly mortality statistics. We wish to take this opportunity to thank medical officers of health generally, for their response to our appeal to send in their cards as early in each month as possible. The preparation of the table for February has been considerably facilitated by the more prompt receipt of a considerable proportion of the cards. As the number of our contributors increases, it becomes still more important that the labour of tabling and calculations should be commenced within a day or two of the beginning of the month, as the whole must be in the printer's hands on the morning of the 10th of each month at latest. We regret to hear that three of the cards sent out do not appear to have reached their destination. In future, we shall be exceedingly obliged to any one of our contributors, who may not receive his monthly card by the

morning of the 2nd at latest, if he will notify the fact on a post card, addressed to the Editor, in order that a fresh card may be sent. It has been suggested that each contributor should be furnished with a supply of these cards, to be used from time to time, but experience shows that the system of sending out the cards each month yields a more satisfactory result.

The estimated population of the 162 sanitary districts for which we publish statistics for February in the accompanying table, is rather more than 7,000,000 persons. The annual birth-rate in those districts furnishing the number of births averaged 35.4 per 1,000, against 33.1 and 35.0 in the two preceding months. The February birth-rate was exceptionally low (less than 25 per 1,000) in Glossop, Leamington, Southport, Weymouth, and Withington. It was exceedingly high (above 46 per 1,000) in Hyde, Chiswick, Ilkeston, Droitwich, West Bromwich, Preston, and Warrington. In small districts the registered numbers of births varies too much for the calculation of reliable annual rates, based upon the returns for a single month.

The annual death-rate in the 162 urban sanitary districts averaged 23.8 per 1,000 of the estimated population in February, showing a further decline from the rates in the two preceding months, which were 25.2 and 24.2 per 1,000, respectively. The average rate in the twenty large towns was 29.0 per 1,000; the death-rate in the smaller districts was, therefore, considerably below that which prevailed in the large town districts. The annual death-rates during February were very low, and below 16 per 1,000, in Chiswick, Eastbourne, Runcorn, Rusholme, Wednesbury, West Derby, Willenhall and Worthing. Death-rates exceeding 33 per 1,000 were recorded in Poole, Morley, Bath, Leek, Camborne, Bangor, Rochester, and Nuneaton. Although in several of these districts these high death-rates were due to excessive zymotic fatality, they appear to have been generally caused by exceptional mortality from diseases of the respiratory organs. The annual death-rate from the seven principal zymotic diseases in the 162 sanitary districts averaged 3.0 per 1,000, against 2.8, 3.0, and 3.1 in the three preceding months. The death-rate from these diseases in the twenty large towns averaged 3.9 per 1,000. No death from any of these seven zymotic diseases was registered last month in 29 of the 162 sanitary districts, though the zymotic death-rate showed a considerable excess in Gorton, Nottingham, Plymouth, Devonport, Luton, Teignmouth, Rochester, Camborne, and Bangor. Small-pox caused 15 more deaths in Bath, against 13 and 16 in the two preceding months, and one in Rochester; no fatal case of this disease was recorded in any other of the sanitary districts from which returns were received. Measles was fatally prevalent in Bangor, Devonport, Nottingham, Plymouth, Rochdale, and West Bromwich; scarlet fever in Barnsley, Derby, Gorton, Ramsgate, Sheffield, Swansea, and Sunderland; and whooping-cough in Camborne, Cardiff, Luton, Rochester, and Salford. Twenty-five deaths were referred to fever in Sheffield during the four weeks of February (against 11 in January), 6 both in Rochdale and Southport, and 5 in Halifax. In Swansea but 3 deaths resulted from fever, against numbers declining from 30 to 7 in the five preceding months.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 6.1 per 1,000 persons living in the 162 sanitary districts, against 7.4 and 5.1 in the two preceding months of December and January. During last month the rate from these diseases showed a considerable excess in Dover, Boston, Morley, Redditch, Poole, Richmond, Reading, Rochester and Nuneaton. The fatality of lung diseases in the last-mentioned town was again very remarkable, the reported deaths from these diseases, which had been equal to an annual rate of 35.0 and 33.4 per 1,000 respectively in December and January, was 28.9 during February. The annual death-rate from all causes in Nuneaton during last month was equal to 47.6 per 1,000 of its estimated population, of which 28.9 per 1,000 was referred to diseases of the respiratory organs.

Infant mortality, measured by the proportion of deaths under one to births registered, averaged 171 per 1,000 in the 162 urban sanitary districts; in the twenty large towns the death-rate of infants averaged 166 per 1,000, against 182 and 161 in the two preceding months. In London last month, owing to the excessive fatality of whooping-cough, the infant death-rate was equal to no less than 178 per 1,000, whereas in the aggregate of the nineteen provincial towns it did not exceed 153. In the smaller urban sanitary districts infant mortality was excessive, and above 200 per 1,000 in Bath, Cardiff, Dover, Leigh, Maidstone, Reading, Rochester, and Ystradyfodwg.

With the approach of spring, and of the commencement of what is known as the 'season' at the majority of watering-places and health resorts, the mortality statistics of these urban sanitary districts acquire increasing value and interest. Our list as at present constituted includes the following fourteen watering-places:—Bangor, Brighton, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weymouth, and Worthing. It cannot but serve the best interests of these fourteen watering-places, to publish for the information of their intending clients the generally satisfactory health bulletins which our table affords the means of showing. The annual death-rate in these watering-places averaged 21.7 per 1,000 during February, and the zymotic death-rate was equal to 2.7. We venture to hope that before long the Sanitary Authorities and Medical Officers of Health of most of the numerous important watering-places will feel disposed to co-operate in this endeavour to supply the most unanswerable reply to false and mischievous reports as to the fatal prevalence of zymotic or infectious diseases, which are not unfrequently spread during the holiday season from sinister motives. Even in cases when one of these health resorts suffers unfortunately from a temporary epidemic of one of these diseases, the advantages of publicity appear to outweigh those of any attempt to keep the fact quiet. Such an attempt (even if justifiable) in these days can scarcely be successful; and then, in the absence of reliable information, such reports are liable to exaggeration and their effects often survive long after the danger has disappeared. Take Blackpool, for example, which has recently suffered from the epidemic prevalence of scarlet fever; intending visitors cannot but be interested to know whether the fatality of the epidemic has ceased.

We are gratified to learn that Lord Beaconsfield has granted to Mr. George Smith of Coalville, Leicester, a grant of £50 from the Royal Bounty to the fund now being raised for the recognition of his services in the inception and passing of the Canal Boats and Brickfields Acts.

SPECIAL REPORTS.

MEETING OF THE METROPOLITAN SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on February 20th, Dr. Bristowe, president, in the chair. After the minutes were read, several letters were brought up from members of the Society respecting the superannuation of medical officers of health, and a report of the Council thereon, recommending that no action be taken at present. Dr. Saunders, Medical Officer of Health for the City, and Dr. Coates, of Salisbury, were nominated as ordinary members, and Mr. Ernest Hart, Mr. Humphreys, of the Registrar-General's Office, and Dr. Longstaff, were nominated as Associates. Dr. Cameron's Bill to encourage and facilitate animal vaccination was considered, when the following resolution was carried, on the recommendation of the Council, 'That having taken the proposed Bill into consideration, the Society is of opinion that if carried into effect, instead of facilitating, it would materially interfere with the vaccination of the population.' The subject of reconsidering the statistical forms recommended by the Society was discussed, and the following members appointed as a committee, viz., the president and secretaries, with Drs. Buchanan, Tatham, Tripe, Dudfield, Hill, Stevenson, and Mr. Turner. The notice of motion by Dr. Corfield, that the President of the Local Government Board be requested to take the necessary steps to place the appointments of medical officers of health on the same footing as those held by the Poor-Law medical officers. As Dr. Corfield was unable to attend, a letter was read, explaining that his notice of motion does not apply to Metropolitan medical officers of health, who are practically appointed for life. Referred to the Council for report. The following resolution was then proposed by Dr. Tripe, and seconded by Dr. Baylis, and carried unanimously, 'The Society of Medical Officers of Health desire to record their high appreciation of the scientific qualifications of Dr. William Farr, and of his long and valuable services in the department of the Registrar-General. They are also of opinion that his able deductions and sanitary statistics have contributed in an eminent degree to the advancement of sanitary science, and therefore entitle him to a special mark of honour and approval. They also wish to express their gratitude to him for his invariable courtesy towards all medical officers of health.' Mr. Murphy then moved that it be referred to the Council for consideration as to the best plan for arranging for the interchange amongst medical officers of health of information as to cases of infectious diseases and deaths therefrom. Carried. He also mentioned certain provisions of the proposed Water Trust Bill for the Metropolis, whereby two-thirds of the governing body would be nominated by Guardian Boards and one-third by Government, and considered that the Vestries and Boards of Works have greater claim than the Guardians for selecting the trustees.

Dr. G. B. Longstaff then read his paper entitled, 'Some facts bearing on the Ætiology of Summer Diarrhœa'. He began by saying, that anything that causes depression of health, and derangements of the digestive organs, predisposes to diarrhœa; but that, in addition to these, he believes there is some active or specific cause for the occurrence of summer diarrhœa, which differs in many respects from ordinary diarrhœa; that at present we cannot say what is the cause, but it is evident, from the investigations which have already been made, that great heat, a diminished rainfall, and the presence of putrescent matter assist most materially in its causation. That it is a mistake to suppose the statistics of death in this country are not sufficiently reliable, for the basis of this investigation, as a comparison with those of other countries, and especially of New York, afford identical results. He proposed to consider the question under three headings. 1. Where does it kill? 2. When does it kill? and, 3. How does it kill? He referred to his diagrams, showing that the rate of mortality varies greatly in different places, being greatest at Leicester, and smallest at Merthyr Tydfil; and that in London it was intermediate between the two extremes. That in country places, the mortality is equal to about one and a-half per 1,000 population; in England and Wales, 2¼; in fifty large towns, 3; and in twenty other towns, 3 7-8ths per 1,000. That in twenty selected towns it was as high as 5.2, and in twenty others as low as 1.8 per 1,000, so that it is evident that local conditions materially affect the number of deaths from diarrhœa, whilst a careful consideration of the geological strata proves that the nature of the soil does not exercise much influence. The tables showed that the greatest mortality occurs amongst the very young and old, chiefly the former, during the hot days of July, August, and early in September, the largest number of deaths being ordinarily recorded in the first week of August. The epidemic period corresponds with a mean weekly temperature in excess of 50° Fahr., and its greatest intensity when the temperature of the Thames water is 62° Fahr., or above. In winter, the mortality is pretty uniform during the whole period, say from November to March inclusive. The curves on the diagram showed that the deaths from 'want of breast milk', 'tabes mesenterica', 'jaundice', and 'enteritis' increase at the same time of year as diarrhœa. The years of greatest mortality, from diarrhœa, were 1849, 1854, 1857, 1861, 1865, and 1868. The lowest mortality occurred in 1860 and 1879, and the highest in 1868, which had a very hot and dry summer. The curve does not always correspond with temperature only, but is influenced by the number of rainy days, being less in rainy summers, probably because rain purifies the air. As to the question whom does it kill? the diagram shows that since 1866, the mortality amongst children under two years old (¼ and ¾ years) has been above the mean of the thirty years 1848-78, whilst it was less than usual for that period for ages above fifteen years. Dr. Longstaff pointed out, that although bad water, and filthy privy cesspools, are more common in the country than in large towns, yet that there are more deaths from diarrhœa in towns, and consequently these cannot be much concerned in the causation of this disease, which he thought arose from miasma evolved in sewers, or from other putrefactive matter introduced into the body through the medium of the lungs.

Dr. Tripe said that he had last year submitted, but in less detail, similar facts to the Society. He had calculated the mortality at different seasons for the years 1840-56, and under one year per 1,000,000 population in London for the years 1860, 1862, and 1874-78, and compared them with the temperature of the ten hottest weeks, with the following results—in 1860 there were 151 deaths under one year per million population, with a mean temperature

of 58.1 deg.; 189 per million with a temperature 59.0 deg.; 347 per million with a mean temperature of 61.2 deg.; 447 deaths with a temperature of 61.7 deg.; 576 deaths with a temperature of 63.7 deg.; and 642 deaths per million with a mean temperature of 64.4 deg. He thought that the cause of the great mortality from this disease at Leicester must be caused by some special cause, as in 1861-70 there died only 84.8 female infants from diarrhœa to 100 males, whilst in London the proportion was 87.5; in Manchester 88.0, and in Liverpool 91.8 to each 100 male deaths at the same age. He also considered that close examination of the years in which departures from the average occurred might lead to some satisfactory results. The President then proposed a vote of thanks to Dr. Longstaff, which was carried unanimously, and expressed his agreement with the proposition that food had not so much to do with the production of summer diarrhœa as is generally supposed. Dr. Corner said that high temperatures are chiefly injurious to weakly children—at least that had been his experience. Dr. Longstaff agreed with the last speaker. As regards Dr. Tripe's remarks, he agreed with the proposition that the discussion of residues has led to most important results, but thought that the correspondence between the mean temperatures as shown in the diagrams, and the mortality under one year, is scarcely sufficient to account for the excess of deaths under two years of age since 1866, as it was somewhat similar in the early part of the period, viz., in 1840-8. The meeting then adjourned.

ON THE QUANTITY AND QUALITY OF THE WATER SUPPLIED TO LONDON DURING 1879.*

DR. MEYMOTT TIDY reports that an average of 32.7 gallons of water per head have been daily supplied during 1879 to upwards of 4,000,000 of people by the eight London water companies; this quantity being, in his opinion, at least one-third in excess of what is necessary, or even advisable. The population within the districts of the companies reside in 573,792 houses, of which about a quarter (138,624) are on the constant service (December). All the water (except about one-nineteenth of the total quantity—viz., that supplied by the Kent Water Company) is filtered before delivery, and no less than 82 acres of ground are covered by filter-beds for the efficient filtration of the water.

In Table I, Dr. Tidy has stated the quantities supplied monthly by the eight London water companies, the number of houses so supplied, and the quantity (including waste) per head of the population. One-half of the water, in round numbers, was taken from the River Thames, and the remainder from the Lea, the New River, and from chalk wells.

Table II shows the average composition of the water of the London companies during 1879.

Dr. Tidy remarks that the year 1879 was an exceptionally trying one for the water companies—indeed, far more trying than any of which he has had experience. The excessive rainfall has rendered the Thames more frequently than usual thick and turbid. It was to have been expected that the analyses would show a larger average amount of organic matter than in previous years, and the only thing which need cause surprise is, that it is not greater than results prove it to be. Notwithstanding this, the death-rate of London for 1879 is the lowest on record.

Referring to the future of the London water-supply, Dr. Tidy repeats what he has said more than once before, that, in his opinion, no better sources of water can be found for the metropolis, considering all the facts of the case, than the rivers Thames and Lea. He trusts, if the companies pass into the hands of Government, that the general management of the several works will be as good as it now is, and that the change the public have clamoured for, and the more efficient working they expect, will be seen, not merely in lessened taxation, but in the improved health of the people and in a lower death-rate.

* The Annual Report submitted to the Society of Medical Officers of Health.

TABLE I.

AVERAGE DAILY SUPPLY TO THE METROPOLIS DURING 1879.

(*Estimated Population supplied by the eight Companies, June 1879, 4,101,200.*)

1879.	Average daily supply in gallons.	Number of houses supplied.	Quantity supplied daily in gallons, per head of the population.
January	137,099,205	552,657	33.2
February	129,941,893	554,227	31.6
March	129,561,672	556,767	31.5
April	128,493,940	557,660	31.3
May	132,584,711	562,058	32.5
June	134,725,591	563,000	32.8
July	135,981,121	565,798	33.1
August	140,308,815	566,755	34.2
September	139,492,704	568,773	34.0
October	134,868,826	571,608	32.8
November	131,877,956	572,505	32.1
December	138,810,978	573,792	33.8
Average	134,478,951	563,800	32.7

NOTE.—It is believed that these quantities are given upon the gross capacities of the pumps, and that they are consequently subject to a deduction of about 10 per cent. to arrive at the net quantities.

TABLE II.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATER DURING THE YEAR 1879.

The quantities of the several constituents are calculated in grains per imperial gallon (70,000 grains).	Ammonia. Saline. Grs.	Ammonia. Organic. Grs.	Nitrogen. As nitrates, etc. Grs.	Oxygen required to oxidize organic matter, etc. Grs.	Total solids. Grs.	Lime. Grs.	Magnesia. Grs.	Chlorine. Grs.	Sulphuric Anhydride. Grs.	Hardness on Clark's Scale. Before boiling. Degs.	Hardness on Clark's Scale. After boiling. Degs.
Thames Water Companies:											
Grand Junction . .	0.000	0.008	0.148	0.094	21.12	7.865	0.583	1.092	1.452	14.3	4.1
West Middlesex . .	0.000	0.009	0.137	0.083	21.03	7.960	0.576	1.078	1.437	14.2	3.9
Southwark & Vauxhall	0.000	0.008	0.124	0.089	20.94	7.524	0.548	1.074	1.482	13.8	3.8
Chelsea	0.000	0.008	0.135	0.065	20.32	7.650	0.590	1.122	1.557	13.9	3.8
Lambeth	0.000	0.008	0.134	0.078	21.09	7.550	0.592	1.116	1.519	14.1	3.9
Other Companies:											
Kent	0.000	0.003	0.392	0.011	28.84	9.580	0.823	1.709	2.550	18.7	6.3
New River	0.000	0.005	0.145	0.045	20.84	7.753	0.535	1.092	1.395	14.1	3.6
East London . . .	0.000	0.008	0.139	0.058	22.21	7.990	0.603	1.193	1.549	14.8	4.1

NOTE.—The amount of oxygen required to oxidize the organic matter, nitrites, etc., is determined by a standard solution of permanganate of potash acting for three hours.

DR. CARMICHAEL ON THE TRAP AND WATER-CLOSET SYSTEM.

A MEETING of the Philosophical Society of Glasgow was held on the 18th of February, Dr. Fergus in the chair, when a paper on 'The Trap and Water-Closet System' was read by Dr. Neil Carmichael. That gentleman explained in the course of his remarks that for a considerable period he has been making experimental investigations into the trap and water-closet system, and the relations of the same to sewage products, gaseous and others; and as a result he had come to the conclusion that germs and other substances injurious to health did not pass through a sound water-trap. Clearly, then, he said, they must look to other sources for the contaminations of the atmosphere which were frequently to be found to prevail in houses, and which proved so serious and injurious to health. He had ascertained from experiments that an opening made by a small pin in a soil-pipe was sufficient to admit particles into a house that were dangerous to health and likely to spread disease, and when they considered how imperfect some of these pipes were in many respects, it was no difficult matter to account for the presence of noxious gases in dwellings. While he admitted that the water-closets in general use, where the traps were perfect, were not so objectionable as some people were disposed to assert, still there belonged to them the serious objection that between the pan and the trap there was a portion of soil-pipe, which was never or rarely free from objectionable matter, and therefore was a fertile source of annoyance and danger. He thought an effort should be made in the water-closets of the future to get rid of this objectionable feature. Dr. Carmichael exhibited a diagram of an improved water-closet, patented by Mr. W. P. Buchan, Glasgow, which he conceived removed all cause of complaint in the direction he had indicated.

The chairman, in moving a vote of thanks to Dr. Carmichael, remarked on the enormous amount of labour that gentleman had bestowed on the subject of which he had treated. He knew no one whose experiments were more trustworthy, or who bestowed more care and attention on the conduct of those experiments.

THE PARKES MUSEUM OF HYGIENE.

DR. STEELE of Guy's Hospital gave a demonstration on 'The Hospital and Sick Room', at the Parkes Museum on Feb. 14. Dr. Steele introduced the subject by referring to the apparent antagonism betwixt the terms hygiene and the sick-room, but explained that while it was the object of the medical art to cure disease, it was equally the aim of hygiene to maintain health, and in their dual capacity of warding off death the one may be said to be the hand-maid of the other. In the sick-room the lessons we had learnt in health had a double significance; first, in teaching us how we might best assist Nature in her attempts at recovery from an unnatural condition; and, secondly, by limiting or entirely preventing the extension of this abnormal condition to others. He instanced especially the necessity for pure air and an abundant supply of it for the sick-room, and illustrated this part of the subject by the various models in the museum of the windows of the chief London hospitals, which are so constructed as to admit the largest amount of air with the smallest perceptible draught. Of the various apparatus for artificial ventilation in the museum, Dr. Parkes gave the preference to that invented by Messrs. Verity Brothers, which, through the agency of a fan propelled by a jet of water, continuously furnishes a measured quantity of pure air to a chamber. The various appliances for the application of heat, cold and moisture to the body generally and locally, were separately dealt with, and illustrated by the valuable collection of articles presented to the museum by Maw, Son and Thompson. What promises to be an interesting and very instructive department of the museum, viz., the sick-bed and its equipment, next came under consideration. The various forms of invalid bedsteads and mattresses were passed in review, together with the numerous appliances for aiding and raising the helpless invalid, in order to have his bed made, or wounds dressed.

Lastly, the uses and abuses of various disinfecting agents for the sick-room were discussed, and while it was shown that the best of them, viz., chlorine and sulphurous acid could not be effectively employed in a chamber so long as the patient occupied it, much might be done to circumscribe contagious disease by the adoption of stringent precautionary measures of isolation. Such had been carried out with great success in many parts of Kent, by trained nurses, under the supervision of Mr. Timmins, the Rector of West Malling, and his rules were well worthy of adoption by other nursing associations. A hearty vote of thanks was passed to Dr. Steele, on the motion of Mr. Taylor, of the Council of the Working Men's Club and Institute Union.

MEDICAL OFFICERS' REPORTS.

BETHNAL GREEN.—This is an extremely good and comprehensive report, and reflects great credit upon Dr. Bate. The various subjects of local sanitary importance all receive intelligent and careful discussion, and it is gratifying to find that so much good work is being done in a district which so much needs it as Bethnal Green. The details of sanitary work are particularly full, and in addition cowsheds, slaughter-houses, bakehouses, disinfectants, mortuary provision (unfortunately not yet made), latrine accommodation for women, water supply, unsound food, Sunday scavenging, second-hand clothing, noxious and offensive trades, and other kindred subjects, all come in for a share of attention. During 1878 the corrected number of deaths in the district was 3,040, against 2,981 in the previous year; and the births numbered 5,195 as against 5,169 in 1877. The death-rate was 23.0 per 1,000 or 0.5 below that for London generally. The proportion of infant deaths to the births was 145.7 per 1,000, against 164 for the whole of London. Very nearly half the deaths were those of children under the age of five years, and more than a fifth were those of persons aged sixty and upwards. The seven principal zymotic diseases caused 525 deaths, giving a zymotic death-rate of 3.9 per 1,000, against 4.4 in the previous year. Of small-pox 334 cases were reported. Twenty-two of these died in their own homes, while 188 were removed to the Small-Pox Hospital, of whom 33 died. Measles was, as usual, prevalent, and caused 59 deaths. Scarlatina caused 68 deaths, 41 being of young children. Fevers caused 36 deaths (26 being enteric, 5 typhus, and 5 simple), besides 15 which occurred in hospital. Whooping-cough was extremely fatal, and caused no less than

192 deaths, or more than 6 per cent. of the total deaths from all causes. Diarrhœa caused 86 deaths, all but 12 amongst infants under 2 years of age.

BIRKENHEAD.—The district supervised by Mr. Vacher has now been extended so as to include various outlying townships, which bring the present population of the district up to some 90,000 persons. In the extended district 2,932 births and 1,656 deaths were registered in 1878, or at the rates of 35.12 and 19.83 per 1,000 respectively. The proportion of deaths of children under one year to births registered was 134 per 1,000, as against 153 for England and Wales. The deaths over sixty years numbered 17.1 per cent. of the total mortality, and the deaths of two centenarians were registered. Zymotic diseases caused 383 deaths, of which 72 were from measles, and 90 from whooping-cough. Measles appeared in March, and became especially prevalent at the end of the year. Whooping-cough was most fatal in the first quarter. With the exception of these diseases, the borough was singularly free from zymotic diseases. Scarlatina and diphtheria were only fatal in a few isolated instances, and diarrhœa mortality was much below the average. The Fever Hospital continued its career of usefulness, though its resources were not so much taxed as during the small-pox epidemic of 1877. Mr. Vacher's report is, as usual, clear and perspicuous, and his tables are full and interesting.

POPLAR.—This district is divided for health purposes between two officers of health, Messrs. Corner and Talbot. In the south district, under the control of Mr. Corner, there were 2,160 births, and 1,148 deaths in the twelve months ended the 31st March 1879. We have before commented on the inconvenience of annual reports being for any other period than that of the calendar year; and have nothing now to add to our former remarks on the subject. The birth and death-rates were respectively 41.1 and 21.8 of the estimated population. Nearly a third of the total mortality occurred in infants under one year, and considerably more than half in infants under five years. The increased mortality is attributable to the prevalence of whooping-cough, from which there were 100 deaths, as compared with 36 in the previous year. During the year 106 cases of small-pox, 27 of scarlet fever, 15 of typhoid, and 1 of typhus fever from this district were reported to the Sanitary Officer. In Mr. Talbot's district the death-rate was 20.3. As a curious coincidence, it may be noted that 100 deaths from whooping-cough occurred in this division also. Diarrhœa caused 96 deaths, which is about the usual number. Both officers chronicle a satisfactory amount of sanitary work, and it is gratifying to find that the Board of Works possess an Inspector of Manufactories, whose express duty it is to supervise the whole of the evil-smelling factories within the district.

ST. GILES'S.—This report by no means does justice to Mr. Lovett's energy of action, being little more than a statement of the deaths which occurred in the district in 1878. During this period the births numbered 1,446, or 27 per 1,000 of the population, and the deaths 1,165, or 21.8 per 1,000, the lowest death-rate in St. Giles's district of which there is any authentic record. Of infants under one year of age 286 died, or 19.77 per cent. of births, and of children under five years of age, 476 died. Zymotic diseases caused 203 deaths, the rate in all the diseases except whooping-cough being below the decennial average. During the year only twenty-four notices were served upon owners to reduce overcrowding, which in a district like St. Giles's seems preposterously small. There is doubtless, however, great difficulty in detecting overcrowding, many of the inmates being away from their rooms, and not returning till night, so that the correct numbers cannot always be obtained. Happily there seems some chance of some action being taken at Great Wild Street and Little Coram Street, under the Artisans' Dwelling Act of 1875.

WANDSWORTH. — The Wandsworth Board of Works possesses five Medical Officers of Health, one for each of the subdistricts within the area of the district. This unusual arrangement has not much to recommend it; but the objections to it are reduced to a minimum by the energy of the several officers. During 1878 the number of deaths registered in the district was 3,275, or 19.8 per 1,000 of the population. In 1877 it was 18.7, and the increase is stated to be due entirely to the greater fatality from measles, whooping-cough, diarrhœa, and lung diseases, and confined wholly to the extremes of life, especially the period of infancy. Zymotic diseases caused 583 deaths; small-pox was fatal in 19 cases, a decided decrease from the fatality of the previous year. Whooping-cough caused 149 deaths, and measles 84, but none of the other zymotics were particularly prevalent. The number of uncertified deaths was large, 50 persons in all being buried in the district without any medical certificate of the cause of death. As regards sanitary work, an increase is to be noted in all departments, but more especially in house inspections. Several matters of much public importance are discussed in the local summaries, as, *e.g.*, the floodings of houses through overchoking of too small sewers, the trapping of house drains, the regulation of cowsheds, and the use of Thames water for drinking purposes.

COMBINED DISTRICTS.

GLOUCESTERSHIRE.—The combined district which Dr. Bond serves so ably was originally formed in 1873, by the organisation of the Local Government Inspector, and by voluntary action on the part of the local authorities. After the combination had been in force five years, it was renewed for a similar period by the authorities. The district consists of the Chepstow, Chipping Sodbury, Cirencester, Dursley, Gloucester, Tetbury, Thornbury, and Westbury-on-Severn Rural, and the Aure, Cirencester, Newnham, Tetbury, and Westbury-on-Severn Urban Authorities. The Stroud Union (including the Stroud and Besley Urban districts), the Wheatenhurst Union and Gloucester City, though in the middle of the district, are not included in the combination, as the authorities refused to join. The area of the district is 397,227 acres, and the population 122,856 in 1871. Dr. Bond's salary is £600 a year, together with £200 (specified) 'to cover travelling and all other incidental expenses'. The district seems to have worked very well; and as the whole of it is easily accessible by rail from Gloucester as a centre, the supervision of it cannot be very difficult. It is impossible not to be impressed with Dr. Bond's reports. They are of so singularly thoughtful a kind, dealing with the difficulties of the district in so broad and judicial spirit, and withal so practical and useful in advice, as to merit exceptional mention amongst a class of literature that is apt to become perfunctory and dry. At the commencement of his labours, Dr. Bond at once set about the proper organisation of sanitary work in his district, and the first object to which he directed attention

was the obtaining of a complete and detailed sanitary survey of the district. To do this, he invented a form of survey which has since been largely copied, and which has been of the greatest possible service. In his first or preliminary report for 1873, Dr. Bond discussed with much breadth of treatment the different questions which called for early dealing with in the district, such as the prevention and abatement of nuisances, house accommodation (as to which his observations are particularly worthy of mention), water supply, and the methods of supplying it, drainage and closet accommodation, the prevention and arrest of zymotic diseases, and other cognate subjects. In his reports for succeeding years these matters were followed up, and in the annual report for 1877 he set the example, which we are happy to find is being now largely followed, of making a general retrospect of the work done in his district during the five years of his appointment, 'with the view of obtaining a standpoint from which to estimate the progress that has already been made in the sanitary improvement of the district, and from which also to forecast the work that still requires to be accomplished in order to place the organisation for the protection of the public health on a thoroughly satisfactory footing.' Dr. Bond's account of this progress may be thus summarised:—The Sanitary Survey was at the date of writing the report very far advanced in most of the districts, and there was none in which the most populous localities had not been thus recorded in detail. The information the survey thus supplied formed an appropriate basis on which to prosecute the abatement of nuisances; and Dr. Bond records that the district is now as free from any serious sources of danger to health arising from the more easily preventable forms of nuisance as it could under the circumstances be expected to be. As to drainage, two complete schemes had been carried out, two other similar schemes were under consideration, and material additions had been made to the existing drainage of three more places. Dr. Bond had drawn attention to the defective state of the drainage of four other places, but in each of these cases practical difficulties of a more or less serious nature have to be encountered in providing a remedy. Systems of scavenging have been arranged in four places. Five complete schemes for the supply of water to separate parishes or contributory districts, had been carried into effect, and numerous other schemes were in progress, as well as material improvements in several cases of existing water-supply. During the first year or two after his appointment, Dr. Bond felt it necessary to examine several hundred samples of water from different parts of the district, with the view of ascertaining the condition of the wells in such localities as presented conditions favourable to contamination, and he still examines some scores annually. As to the dwelling accommodation for the labouring classes, though there is still room for great improvement, 'there is no doubt that public opinion, both on the part of owners and occupiers of houses, is becoming awakened to this matter. For owners of houses, on the one hand, are learning that they will not be permitted to let their property fall into the state of disrepair which has been tolerated hitherto, because no one had any power to prevent it; and tenants are learning, on the other hand, that whilst the law can compel their landlords to put their houses into a proper sanitary condition, they will be expected, on their part, to do all that can be reasonably expected of them to keep it so.' Overcrowding is, too, steadily diminishing. As to the prevention of infectious disease, Dr. Bond feels, with other medical officers, the difficulties of his position in not knowing of the existence of the disease till it has obtained too strong a hold to be easily dislodged; but, with regard to the pauper class, he has succeeded in securing, in all parts of the district, by one means or another, that information is given to him with fair punctuality of the occurrence of any infectious cases. Immediately on the receipt of such notification, the inspector inquires, and reports to Dr. Bond the circumstances of the case of the proceedings which have been taken with regard to it. When the case is the first one of its kind in the locality, Dr. Bond invariably visits it at the earliest opportunity, especially if it be a case of scarlet fever, in order to exercise his influence in preventing the spread of the disease. At the same time disinfectants are supplied, if not already provided, advice given as to the proper way to use them, and printed information as to the general precautions to be observed are left. Finally, on the disappearance of the disease from the premises, the occupier and the owner are, if it be considered necessary, called on to cleanse and disinfect the premises of their contents, and the former is required to fill up a form, stating in what way those measures have been carried out. Dr. Bond does not, of course, regard these proceedings as at all complete; but still, they are useful, and cannot but have an effect in checking the spread of disease. It is to be regretted that Dr. Bond has not added to this most interesting retrospect an examination by the numerical method of the improvement in the public health, viz.: by the testimony of the vital statistics of the district; but we believe he regards the period since his appointment as being too short to allow of any trustworthy conclusions being drawn from any statistics that are obtainable. In his last published report (that for 1878), Dr. Bond carries on the story of sanitary improvement, and in addition has some very able comments on the yearly statistics of the district, regarded as a whole. The simplest and least questionable test of the sanitary state of a district is the death-rate; and tested by this condition, the state of the district was, on the whole, very satisfactory in 1878. The death-rate, in seven of the thirteen districts, did not appreciably exceed 17 per 1,000; in five of the remaining six it did not exceed 20 per 1,000; and in only one (Cirencester) did it reach the unquestionably excessive point of 29.5. This latter mortality was chiefly due to the fatality amongst young children, of measles, whooping-cough, and inflammation of the lungs, the latter of which was in many cases probably connected with the epidemic influence of the two former diseases. When we come to apply to the district as a whole the still more searching test of the district mortality from zymotic diseases, we find a corroboration of the inference drawn from the general mortality. Thus, in the whole district, there were only two deaths from the variolous group of diseases. The mortality from scarlatina, which was at its maximum in 1876, when the deaths were 113, and which fell to 94 in 1877, were in 1878 only 26, which is considerably less than in either of the years preceding 1876, viz., 1875, when it was 71, and 1874, when it was 60. It is, therefore, evident that a wave of scarlet fever had been sweeping through the district during the five years 1874-8, the crest having passed in 1876, and that the decline from this point has been much more rapid than was its rise. Dr. Bond not unfairly infers that this result had been in a measure due to the more effective

supervision under which the district has been placed in each succeeding year, as its weak points have become known, and especially to the check to the progress of the disease which has been exercised by counselling the closure of schools in cases when it seemed necessary, and by instructing the masters and managers to exercise special caution in the admission of pupils in any case of infectious illness. From diphtheria and croup only twenty deaths were registered; and in commenting on this, Dr. Bond draws attention to the infrequency of genuine diphtheria in his district, nothing like an epidemic of it having occurred anywhere in it since he has been Medical Officer of Health. There would appear to be something in the air or soil of this district which is not favourable to the development of the disease. The mortality from measles and whooping-cough, 131 and 40 deaths, was by no means satisfactory, the deaths from both slightly exceeding those of 1877. Dr. Bond adverts to the improbability of any effectual diminution of the mortality from the recurrent visitations of these two diseases, and observes, with characteristic humour, that 'the great mass of mothers are so convinced that these diseases are the inevitable attendants on childhood, that any advice or instructions which are offered in such cases are received with placid indifference, if not with ill-concealed contempt. Providence, they assert, sends them, and to Providence, aided occasionally by a little gin, they trust for their removal'. Only seventeen deaths occurred from enteric fever, which, in a population of about 130,000, cannot but be considered as a result as favourable as is likely to be attained under the present circumstances of the district. But several, even, of these lives might in all probability have been saved had the Authority received timely notice of the occurrence of each case. In many of them such notice was only received after death had actually occurred, and when a good deal of mischief had been already done. It is clear from these facts that substantial sanitary progress is being made in Gloucestershire, under the guidance of Dr. Bond, and that the combination is working extremely well. This view is further borne out by Dr. Bond's reports on each individual district, where the sanitary history of the year is told in well chosen language, and the wants of each locality duly set forth. The reports abound in cases of much etiological interest, and are generally of a very instructive type. We heartily wish that other medical officers followed Dr. Bond's example in making their reports equally full and interesting.

MID-CHESHIRE. — This combined district was formed in November 1873, by voluntary action on the part of the local authorities. The first holder of the office of medical officer of health was Dr. T. R. Fraser, of Edinburgh, who after being first appointed for two years, and subsequently for another three years, resigned the appointment in July 1877, on being made Professor of Materia Medica at the University of Edinburgh. So far as we can learn, Dr. Fraser never made any reports at all, and it is therefore impossible to express any opinion on his work. On his resignation Mr. J. M. Fox, who had previously been acting with conspicuous success as health officer for Cockermouth and its vicinity, was elected, after some delay and a severe struggle, as his successor. The present appointment expires on the 25th December of the present year, and is remunerated by a salary of £800 per annum, which includes all expenses. The officer is required to devote the whole of his time to the duties of his office. The districts now included in the combination are the Altrincham, Congleton, Nantwich, and Northwich Rural, and the Lymm, Middlewich, Nantwich, Northwich, Sandbach, and Winsford Urban districts, one or two of these having come into the combination since it was first formed. The district is still far from being a satisfactory one in the sense of including all the sanitary districts within its area. Thus in the Altrincham Union, the Sale, Bowdon, Altrincham, and Wilmslow Urban districts, in the Congleton Union, the Buglawton and Congleton Urban districts, and in the Nantwich Union the borough of Crewe and the Urban district of Tarporley, have separate officers of health. It may be hoped that when the question of Mr. Fox's reappointment comes up for consideration, some alterations may be made in the area with the view of rendering this anomaly less glaring. The present area of the district is 281,233 acres, and the estimated population 130,134. It is greatly to be regretted that Mr. Fox has no statistics to give for any period before 1878, so as to show the variations and improvements that have taken place in recent years. Throughout his annual report for 1878 there is not so much as a reference to the mortality of former years; and as to the general sanitary circumstances of the district nothing whatever is said. The facts given as to sanitary action during the year (where they are given at all) are of the most meagre kind; the report consisting almost exclusively of comments on the mortality statistics of the various districts. This is, we think, a grave omission, and one that in future reports should be corrected. As there are no figures available as to the whole district, and no statements as to the relation which the existence of a particular disease in one place had with its existence in another, it is impossible to give any sanitary picture of the district for the year; but it may be stated that the birth-rate for the district in 1878 was 37.6, and the death-rate from all causes 21.3. The seven principal zymotic diseases caused a death-rate of 3.29, phthisis 1.84, other diseases of the lungs 3.31, and heart diseases 1.23 per 1000. The percentage of deaths under 1 year to registered births was 13.9, or 1.4 less than that for England and Wales. One of the most noticeable features in the returns is the vast proportion of deaths from consumption in certain districts. The deaths from this single complaint exceed in the Altrincham rural district those of all the other preventable diseases taken together. Thus, while 59 deaths out of a total of 559 were ascribed to consumption, only 46 were due to the entire zymotic group. In the Altrincham rural district, 10.6 per cent. of the total deaths; in the Congleton rural district, 13.2 per cent.; and in the Nantwich rural district, 9.7 per cent. of the deaths were caused by consumption alone. On this subject of consumption, Mr. Fox has in various parts of his report some very interesting observations. He says that he has always thought it his duty to advert specially to any undue mortality from consumption, (1) because it has a distinct tendency to enlarge the area of pauperism, since it is a disease preying exclusively on adults, lingering and disabling in its nature, and to ordinary persons, incurable; and (2) because much misconception exists as to the preventability of consumption. Mr. Fox adverts to the proofs which have been afforded that the continuous breathing of a damp, sodden and devitalized air has much to do with the promotion and development, if not the distinct origin, of the disease. He suggests whether increased attention to the drainage of the foundations

of houses, and the improved ventilation of living rooms and cutlery shops, would not result in a reduction of the excessively high mortality from consumption. Overcrowding, too, should be everywhere repressed as having a distinct bearing on the disorder. All these matters are within easy scope of the powers of a Sanitary Authority, and attention to them has, fortunately, as much a tendency to the preservation of property as of life. The death-rates of the component sanitary districts vary greatly, especially those of the urban districts. Whilst the rates in the rural districts were 19.2 in Altrincham, 18.7 in Congleton, 19.8 in Nantwich, 18.2 in Northwich, they ranged from 15.5 at Lymm urban district to 22.5 at Nantwich, 23.5 at Sandbach, 27.5 at Winsford, 30.6 at Northwich, and 31.4 at Middlewich. The last four rates (which are terribly high for such places) are variously accounted for; Sandbach was harassed by 'an almost unopposed concurrent epidemic of measles and scarlatina', which in the last quarter caused the death-rate to reach the high figure of 42.1 per 1,000. In addition there were 10 deaths from typhoid fever, and 9 from phthisis. At Winsford there was an exceptional prevalence of scarlatina and other zymotic complaints throughout the year, but especially in the first two quarters. Scarlatina alone caused 32 deaths. There was at Northwich a continuous and severe epidemic of scarlet fever, which was very fatal to young persons. No less than 43 deaths, 28 of children under five years of age, were registered from it. At Middlewich, which had by far the largest death-rate, there was an unusual prepondence of lung complaints, particularly fatal to young children. All these four places had of course large infantile death-rates. With these facts, the story of the year, as recorded by Mr. Fox, is pretty well told. We hope that next year Mr. Fox will give more particulars as to the sanitary circumstances of his district, as to the progress made in sanitary improvements, and as to his own personal action. His tables, too, might with great advantage be brought together and condensed, so as to admit of more ready comparison and reference than is now practicable.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

NUISANCE FROM OVERCROWDING.

1876. *Home* v. *Kelso Local Authority.* "Public Health (Scotland) Act, 1867," 30 & 31 Vict. c. 101, s. 1, subs. F.—Nuisance from overcrowding—Where a landlord lets a cottage which comes under the control of the tenant, without restriction, the landlord is not, in the sense of the Statute, the author of the nuisance, nor jointly liable for the act or default of his tenant in allowing overcrowding on the part of a sub-tenant. (3 Couper, 239.)

SEWERAGE POWERS OF BOARDS.

1879. *Newington L. B.* v. *Cottingham L. B.* —Agreement dated 1874 between two Local Boards that the sewage of the C. District should be allowed to enter the sewers of the N. District, subject to the restriction that no sewage from any third district should be admitted—Claim by outside landowners to use the C. sewers in accordance with the provisions of the "Public Health Act, 1875", s. 22—Held that they might do so, s. 22 operating to repeal the conditions of the agreement of earlier date. (48 L.J., Ch., 226; L.R., 12 Ch.D., 725; 40 L.T., 58.)

WATER COMPANY POWERS.

1879. *Sheffield Waterworks Proprietors* v. *Wilkinson.* "Waterworks Clauses Act, 1847," s. 74—Water cut off because a late tenant was in arrear—Proceedings by new tenant to compel the Company to make a new connection and resume the supply—Judgment for the Company, there being no such obligation on the Company as the plaintiff contended—*Semble* that the Company has no right to refuse to allow the restoration of the connecting pipe and the supply of water till the bygone rates have been paid up. (48 L.J., C.P., 145; L.R., 4 C.P.D., 410; 41 L.T., 254; 43 J.P., 703.)

LANDLORD AND TENANT.

1879. *Midgley* v. *Coppock.* Vendor and purchaser —Agreement to pay outgoings up to date—Sewering and paving expenses held to be an "outgoing" which the vendor was liable to pay under his agreement. (48 L.J., Ex., 674; L.R., 4 Ex., 309; 40 L.T., 870; 43 J.P., 683.)

BANKRUPTCY OF CHURCHWARDEN.

1879. *Leftley* v. *Mornington.* "Metropolis Management Act, 1855"—Members of vestry—Churchwarden.—Disqualification—Bankruptcy. (48 L.J., Ex., 543; L.R., 4 Ex., 307; 40 L.T., 850.)

SEA-SHORE.

1879. *A.-G.* v. *Tomline.* Injunction granted to restrain removal of shingle on sea-shore, so as to endanger land—An obligation lies on every subject to do nothing to destroy the natural banks of a river or of the sea. (48 L.J., Ch., 593; L.R., 12 Ch.D., 214; 40 L.T., 775.)

PAVING EXPENSES.

1879. *London, Brighton and South Coast Railway Co.* v. *St. Giles, Camberwell, Vestry.* "Metropolis Management Amendment Act, 1862," s. 77—"New street"—Road public up to a railway bridge, and private beyond, railway being in a cutting below—Held under the circumstances that the Railway Company were not liable to contribute to the paving of the new public road by reason of being owners of the slopes of the cutting. (48 L.J., M.C., 184; L.R., 4 Ex.D., 239; 41 L.T., 162.)

HIGHWAY.

1879. *Reg.* v. *Wallace.* "Highway Act, 1835," ss. 85, 91.—Where Justices certify that a new road will be more commodious than the one for which it is proposed to be substituted, it must unequivocally appear on the face of their certificate that they have arrived at that conclusion from personal inspection, and not from statements made to them—A certificate for a diversion need not specifically state that the old road would become unnecessary. (L.R., 4 Q.B.D., 641; 40 L.T., 518; 43 J.P., 493.)

BUILDING, DEFINITION OF.

1847. *Watson* v. *Cotton.* "Reform Act, 1832," s. 27—Shed formed of six posts let into the ground—Tarpaulin roof—One side boarded up with boards nailed to the posts—Such shed held to be a "warehouse" or "other building". (17 L.J., C.P., 68; 5 C.B., 51; 2 Lutw., Reg. Cas., 53.)

COMMONS.

1879. *A.-G.* v. *Tyssen-Amherst.* "Metropolitan Commons Act, 1866"—Scheme thereunder duly confirmed by Parliament saving rights of a beneficial nature previously enjoyed—Bill to restrain defendant

from digging gravel dismissed, his rights being such as it was in the contemplation of Parliament to protect. (*Times*, April 2, 1879.)

LIBRARIES.

1879. *Froomberg* v. *Balding*.—Sailors' Home, Whitechapel—Beer sold without a license—Proceedings against the Manager for breach of the "Licensing Act, 1872," s. 3—Held that the alleged offence was not proved—*Semble*, that for such an Institution no license is necessary. (*Times*, March 29, 1879.)

SCAVENGING.

1879. *Collins* v. *Paddington Vestry*. "Metropolis Local Management Act, 1855," s. 125—Contract with Local Authority that plaintiff should remove "Dust" and "Refuse"—Miscellaneous metal and other articles of value abstracted from the dust-carts by the dustmen, and retained by them for their own profit—Held that such articles were not *ejusdem generis* with "dust", etc., which the contractor was entitled to have, or for the detention of which he was entitled to compensation. (48 L.J., Q.B., 345; 40 L.T., 843; 43 J.P., 367.)

PARLIAMENTARY PROCEEDINGS.

HOUSE OF LORDS.

(*February* 26.)

The Artizans' and Labourers' Dwellings Improvement (Scotland) Act (1875) Amendment Bill was read a third time and passed.

THE REGISTRAR-GENERALSHIP.

In reply to the Marquis of Lothian, the Earl of Beaconsfield stated that, while fully recognising the delicacy of the duties devolving on a minister having the distribution of patronage, and at the same time being conscious that he had never made an appointment of any kind without due regard to the interests of the public service, the recent appointment of Registrar-General had been made solely with a view to the fitness of the gentleman appointed, and in the knowledge that the state of health and the advanced age of Dr. Farr precluded the possibility of his being able to carry out the arduous duties of the office, specially with reference to the work of the forthcoming census.

HOUSE OF COMMONS.

(*February* 13.)

RIVERS CONSERVANCY BILL.

Mr. Sclater-Booth, replying to Mr. A. Peel, said the Government were of opinion that it would not be expedient to re-introduce the Rivers Conservancy Bill of last session.

(*February* 23.)

WATER SUPPLY.

Mr. Rowley Hill asked the President of the Local Government Board whether, in view of applications from various districts to take water for their own purposes from watersheds with which they have no natural connection, the Government were prepared, in anticipation of legislation upon the subject, to initiate an inquiry into the whole question of water supply.

Mr. Sclater-Booth stated, in reply, that the Government did not consider there was any occasion for a special inquiry, there being ample information on the subject.

DR. FARR.

The Chancellor of the Exchequer stated, in answer to Dr. Playfair, that a special pension of £800 a year had been awarded to Dr. Farr in recognition of his long and able services in the Registrar-General's office.

(*March* 1.)

VACCINATION STATISTICS AT DURHAM.

Mr. Gourlay asked if attention had been directed to the reports of the vaccination-officers of the Durham guardians for the year 1878, in which they stated that, out of 2,381 children born in the Western and St. Nicholas district, 305 died from the effects of vaccination; and, during the first six months of last year, the number of deaths in the same union, from the same cause, was 141. Mr. G. Sclater-Booth said the reports of the vaccination-officers of the Durham guardians for 1878 and 1879 had been carefully examined. They contained no information as to the deaths from vaccination; but they contained the number of children born, and who died previously to vaccination. As he found the number corresponded very nearly to the numbers stated in the question, the excessive mortality was the mortality of the children who had died before vaccination.

(*March* 2.)

TEA ANALYSIS.

In reply to Mr. Verner, Sir H. Selwyn-Ibbetson said—It is not quite correct to say that there is an appeal from the verdict of public analysts to the laboratory at Somerset House. What the Act of 1875 says is that upon the request of either party in a case the Justices, or Court of Appeal, may in their discretion cause any article of food to be sent to the Commissioners of Inland Revenue for analysis. And I understand the object of this clause to have been to provide the Courts with the means of obtaining an independent scientific opinion, rather than to give an appeal against the decisions of public analysts. At any rate, it gives no absolute right of appeal. In respect of tea, the Act puts the Commissioners of Customs in the position of a court of law. Their discretion is absolute and final; and as it is important that they should exercise that discretion promptly and without delay, it was probably thought right to keep the machinery by which they arrive at their decisions as simple as possible. So far as I am aware, exception has very rarely been taken to the decisions of the Board, and the present arrangements seem to me to work satisfactorily.

THE VACCINATION BILL.

Dr. Cameron moved that the order for the second reading of the above Bill be discharged, as he did not think the House or the country was in a condition to discuss the subject.—The order was discharged accordingly.

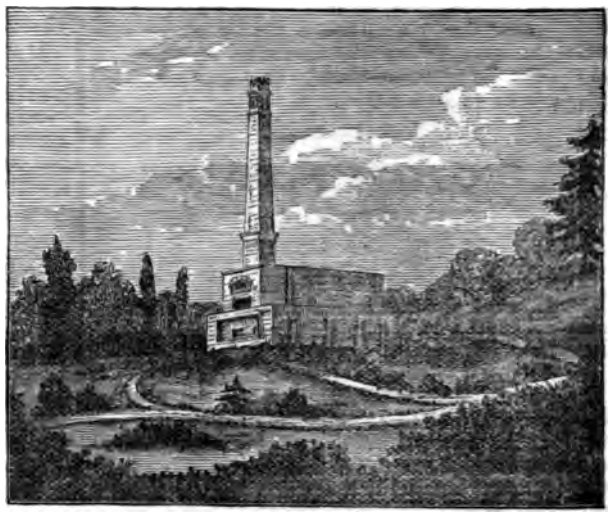
Mr. Hawkesley, C.E., has just presented a report on the drainage of Weymouth, which for some years has been a question of considerable difficulty. He proposes works which are estimated to cost £25,000, and suggests that the causes of effluvia can only be completely removed by reclaiming certain submerged lands, which would cost from £20,000 to £80,000. The area to be dealt with is 250 acres. He believes the proposed works will be successful in an engineering sense, if carried out.

REVIEW.

The Transactions (Vol. 1) *of the Cremation Society of England, containing a short history of the subject of Cremation at home and abroad, up to the date of the sixth anniversary of the Society*, January 13, 1880. Edited by W. Eassie, C.E., Hon. Sec. to the Council. London: Smith, Elder, and Co. 1880.

Those who desire to inform themselves of the facts regarding cremation would do well to consult this shilling volume, for besides a *résumé* of the subject up to 1880, it gives a complete bibliography to the same date, and may, moreover, be taken as yielding nothing but the most authentic information.

Leaving the work to be judged by its own merits, we give our readers a view of the Crematory erected by Mr. Eassie, the Engineer of the Society, at Woking, for the Council, and which is complete as far as regards the furnace portion of the establishment. The reception room and chapel has, however, yet to be erected, and will form some small addition to the present building. At present the grounds have been fenced in, and the ornamental planting and roads are about to be commenced. The system of reduction adopted at Woking is the same as approved at Milan, after many experiments made with rival Italian processes, and is known as Professor Gorini's system. In this arrangement the furnace is placed apart from the crematory chamber, and the ashes which result from cremation are therefore free from foreign admixture. The products of combustion, as they pass through the atmosphere, are also completely purified by means of a supplementary fire, placed near the base of the chimney.



VIEW OF THE FURNACE PART OF THE WOKING CREMATOR

An experiment made with this Crematory at Woking upon part of a carcass of a horse, weighing 140 lbs.—which is the average weight of a moderate sized man—proved to the complete satisfaction of several gentlemen present, that the most perfect combustion was attained. Not the slightest trace of odour was discernible in the immediate vicinity of the crematory chamber, and no particle of smoke was seen to escape from the chimney. The ashes, when withdrawn from the chamber after combustion ceased, were perfectly white and weighed about six pounds.

The rite of cremation is now extensively carried out at Gotha, in Germany, and at Milan and Lodi, in Italy. At these cities about a hundred cremations have taken place, and splendid buildings have been inaugurated for the purpose, with suitable *columbaria* to receive the urns. The municipal authorities of Zurich, Udine, Paris, and other continental cities, have also approved of cremation as presenting the best means of disposing of the dead without injury to the living, and cremation will shortly be in operation there. Those who approve of cremation in Berlin, Leipzig, Breslau, Hanover, and Vienna, have, pending the erection of furnaces in these countries, availed themselves of the facilities existing at Gotha. Endeavours are now being made to legalise cremation in Holland, and nine numerous and influential societies have, been founded there for the purpose; indeed, the same may be said of nearly all the larger cities abroad.

In England, the Cremation Society was established in 1874 in London, soon after Sir Henry Thompson's articles in the *Contemporary Review* on that subject; it is composed of members of all classes, and hopes are entertained that the temporary delay in using their building, in obedience to the wish of the Government, will soon be ended. The Home Secretary allowed that cremation was not opposed to any existing law, but his law advisers had led him to believe that inasmuch as the registration of deaths in this country had always been associated with burial in the earth, he was obliged to inform the Council that the new rite should first be approved in Parliament. He advised a short Bill in the House of Lords, and said that were he to permit cremation to be carried out at Woking, where, from the samples of ashes exhibited to him, he was satisfied everything was conducted scientifically and properly, he could not, without proper rules being in force, stop objectionable cremations in other places. The Council have therefore decided to give the matter further consideration, and meanwhile to keep in repair and beautify their property.

On a former occasion we reviewed another and larger work of the same author upon the same subject, but treated in a more scientific spirit.* The present small volume is, however, fitted for the general public, who are, as a rule, anxious to learn all that is being done here and abroad, in what is considered by its supporters to be a most necessary reform in the method of disposing of the dead.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

VENTILATION OF SEWERS BY SOIL-PIPES.

I am induced to write by seeing Mr. Buchan's letter of December 27th, 1879, in your issue of the 15th January 1880. In this letter Mr. Buchan points

* *Cremation, and its Bearings on Public Health.* Smith, Elder and Co., London.

out a serious error in one of Mr. Denton's recommendations, where a pipe intended to ventilate the space above the trap of a Bramah closet would really have the effect of rendering that trap useless. A somewhat similar though less glaring error appeared in the first issue of my own little book on healthy houses; this makes me anxious to state that I entirely concur with Mr. Buchan on this point. Indeed, I cannot but attribute the faulty design to some oversight in Mr. Denton's case, as in my own.

I also wish to lay before your readers some similar cases of misconnection which have come under my notice, discovered by the engineer of the Sanitary Protection Association in Edinburgh.

Case 1.—The first case is shown in fig. 1. A ventilating pipe, B, served to establish a direct untrapped permanent communication between the gas in the soil-pipe and the air over the water-closet trap. The arrows show the path which lay open to sewer gas, rendering the trap of no effect. The same pipe, B, would establish a connection between the room in which the hand-basin stands and the soil-pipe, if at any time the small trap at D were dry.

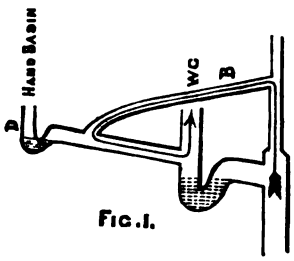


Fig. 1.

Case 2.—In this case the designer wished to give the security of a double trap. He also wished, very properly, to ventilate the space between the two traps, but by an excess of ingenuity in leading the ventilating pipe, C, back into the soil-pipe, he rendered the second trap perfectly useless.

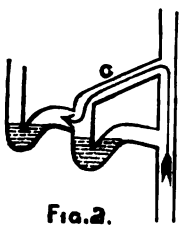


Fig. 2.

Case 3.—This case shows equal ingenuity of design, likely to be more fatal in its results, for in Case 2 one trap was left efficient. The figure explains the connections, and shows how a direct path for the gas from the soil-pipe was opened into the cellar under the building. The designer's object was evidently excellent; he wished to ventilate his soil-pipe, and so provided the opening at A, forgetting that whenever a path is open to gases you must be prepared to find that occasionally the flow will occur in the contrary direction to that which you contemplate as desirable.

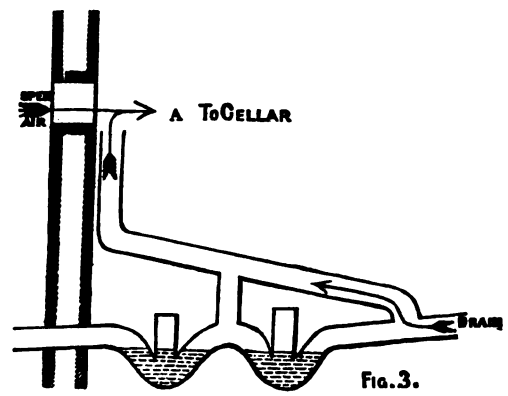


Fig. 3.

Case 4.—This case is very similar in its effect to Case 2. If the front trap is forced, a direct communication is left for the gas to pass into the house. Here, again, the designer contemplated that in such a case the gas would go out to the open air, but in many cases the draught runs into a house through these ventilating openings, just as it runs into a house through the keyholes of the doors. These four are the principal forms of misconnection which have been found, arising from a mistake on the part of a well-meaning designer. Some other results of our experience may, however, be interesting to your readers.

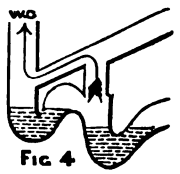


Fig. 4

Case 5.—We have found several cases in which Mr. Potts' excellent 'Edinburgh' trap has been so laid as not to be a trap at all. The design of this trap gives a comparatively small seal, even when the trap is properly laid. The object is to diminish liability to choke, but this merit renders it specially necessary that traps of this design should be laid by careful workmen, and inspected as soon as fixed.

Case 6.—A similar defect was discovered in case of two of Mr. Buchan's traps. There was a rapid natural fall in the ground, and the mason had placed the traps, as shown in fig. 5. It must be clearly understood that this defect was in no way due to the form of the trap, which is excellent, and largely used at the recommendation of the association.

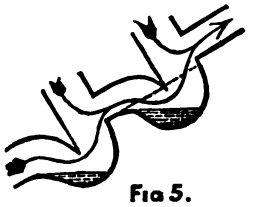


Fig 5.

Case 7.—We occasionally find traps carelessly manufactured so that there can be no seal, however they are laid.

The above defects could most of them be discovered by simple inspection. Those which I will now mention were detected either by the smell of paraffin which had been poured into the pipes, or by the smell of the drains. In one case a simple open pipe was discovered leading straight from the soil-pipe upwards into a room. The pipe had been cut off for some cause, and never closed. In a second case, where an old pipe had been cut off and properly closed, a hole was found just opposite the closed and disused branch. It would be well in all cases to cut these disused branches off close to the soil-pipe, otherwise they remain as receptacles for foul gas, where decay is most likely to occur, and where it is little likely to be detected by the eye.

The following interesting case was wholly new to me, and points to a serious source of danger (fig. 6). The water in a trap on a cistern waste pipe froze and burst the trap at A: when the thaw followed, the water ran out and left a direct opening from the soil-pipe into the cistern. The waste-pipe here was of course improperly placed in the first instance, but the plumber considered that he had made everything safe by putting in the trap.

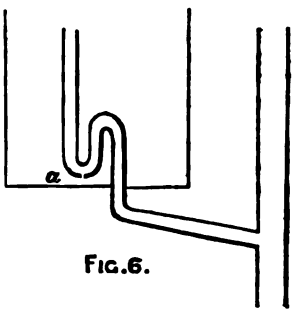


Fig. 6.

The following two cases may be interesting to inspectors. A drain passing under a house was to be

filled with water for the purpose of ascertaining whether it was really watertight. For this purpose a plug of clay was inserted at A, and water poured in at B. The workman, however, took a double bond of fate by inserting a second clay plug at C. The water naturally maintained its level with great constancy at B. Our engineer discovered the trick, but the workman's employer, while disapproving of the action, declined to dismiss the workman, considering the action merely as an ignorant excess of zeal.

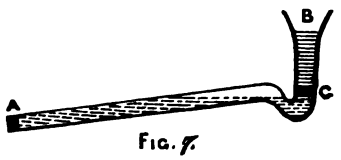


FIG. 7.

The second case is illustrated in fig. 8. A plumber who was told to put in a 3½ in. air pipe, did so for a foot or so, so as to give an excellent external appearance, while the insufficient little old pipe was left concealed inside the house. I am happy to say that cases like these are rare.

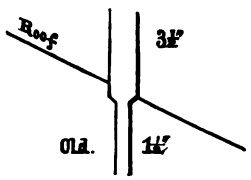


FIG. 8

Our association prospers. The chief difficulty met with is that of explaining to members the necessity for continual inspection. Our first reports are in good demand, and our recommendations are usually carried out with a thoroughness and willingness which greatly exceed any expectations I had formed. Unfortunately, once our member has had his house put in thorough order, it is difficult to make him understand that in the best systems pipes will wear out and stoppages will occasionally occur; that without experimental investigation systematically made these defects may escape notice until illness arises in the house. I think I may confidently call on you, and on all who have any practical familiarity with sanitation, to assist in educating the public and in explaining to them that sanitary contrivances are not like the stone walls of a well built house, which may be expected to last for an indefinite time without examination, but form a complicated system, the parts of which, like the working parts in trains of mechanism, require continual examination if they are to fulfil their functions properly. The visits each householder receives from inspectors acting on behalf of water companies or trusts prove that this point is recognised so far as the system of pipes and valves carrying clean water into our houses is concerned. It is not duly recognized for the system of pipes and traps carrying foul matters out. The clean water taps and pipes are, in Edinburgh, inspected at public expense, while the foul water pipes and drains are left to chance. Yet a defect in the clean water pipes involves merely a waste of water, that is, of money; a defect in the foul water system, a waste of life.

In bringing the above results of our experience before your readers I have omitted all reference to the more common defects with which all inspectors must be familiar, the stoppage of pipes or traps, the imperfection of joints, and the decay of pipes. These things are so common that it would be a waste of words and of paper to describe them, and yet the public does not know that it is worth while to pay an inspector to come and ascertain experimentally whether the foul water system of their houses is in proper working order. Clearly their action, or rather inaction, is due to ignorance and not to any dissatisfaction with our recommendations, for the very member who neglects to pay his second guinea has in very many cases spent a large sum in carrying out the recommendations made in the report which he received for his first year's subscription.

Edinburgh, Feb. 1880. FLEEMING JENKIN.

VENTILATION OF ROOMS.

A little reflection should easily have enabled Dr. Stainthorpe (SANITARY RECORD, page 318) to understand that his plan was inferior to that shown on page 161, as Councillor Smith's. The mere fact that to enable Dr. Stainthorpe's plan to work, he requires that 'care be taken to keep the spaces between the horizontal bars of the fire-grate free from ash', shows something wrong, both scientifically and economically. And to mention the 'Parson's grate', which appears to be designed to economise fuel, in such a case is simply absurd. Coals cost money, and continually poking the fire takes trouble. Consequently, as this expense and trouble are both saved by Councillor Smith's plan—and also a better draught produced—it would be a mistake to use Dr. Stainthorpe's plan. Dr. Stainthorpe says he requires proof that his 'proposed improvements are inferior'; the proof lies first in a common sense examination of the idea, and secondly in the experiments made by me with an anemometer. As to the fire burning any disease germs in the air, it would not burn a tenth part of those that would be destroyed by the sulphur and smoke in passing up the chimney, in the plans shown on pages 161 and 277. I think Faraday referred to the value of smoke and sulphur in the atmosphere for that purpose. Mr. H. K. Bromhead, architect, Glasgow, tells me that his father used the plan shown on page 161 long before Councillor Smith, but he says he never saw the plan on page 277 used. Instead of cutting the stove, to get the pipe in to the back of the grate, a new plan of mine, but which does not look so well, is to cut a hole or holes in the face of the grate, and attach the pipes on the same principle as most suitable. W. P. BUCHAN.

THE INSPECTION OF MEAT.

Can you inform me if any book is published with reference to the inspection of meat, and detection of unsoundness or disease, rendering it unfit for the food of man.—I am, etc., C. J. E.

[We know of no book that would afford the slightest help in inspecting diseased meat; but our correspondent will find valuable hints on the subject in Mr. Francis Vacher's Paper, 'On the Diseases of Animals, rendering them unfit for Food for Man', published in the SANITARY RECORD (old series), for Sept. 27, and Oct. 4, 1878; and Dr. Junius Hardwicke's 'Meat as Food for Man', SANITARY RECORD (new series), Feb. 15, 1880.—ED.]

BLACKPOOL DRAINAGE.

In your last issue was enclosed a lithograph copy of Blackpool drainage requirements, 'specialities', 'their sanitary appliances, etc., which are designed as a guide to architects, builders, owners of property,' etc. Really, Mr. Editor, these arrangements and sanitary appliances for the health of the inhabitants of dwellings in Blackpool are very defective, and although sanitary science is so far advanced, it seems possible even now that unscientific designs may be adopted with impunity. It is to be hoped, however, they will

not escape the notice of sanitary engineers generally. If the ideas of such eminent men as Mr. Eassie and others are to be noticed at all (and they deserve the highest consideration), then the requirements of the Blackpool corporation for the further improvement of the health of the householders and visitors of this noted watering place—as delineated on the sheet referred to—must be contrary to practical sanitary science. I do not say the whole thing is wrong. There are points aiming at improvement, which should have had the further consideration of the gentlemen who attach their names to the plans. Take the soil-pipe ventilator, where windows are near, and the position, real use, and advantage of the rain-water pipe as shown. This requires further explanation. Then the water-closet pan also. Surely no experienced engineer would fix a syphon in the position shown, five or six pipes in depth, under a yard floor, where the soil from a water-closet and culinary slops are passed through, or may remain by the choking of the trap; and, as shown, could not be thoroughly cleansed without taking up the yard and digging down, as I find necessary in my practice in my official duties every day, where such errors are made. See plan, No. 1, yard surface, where foul air may rise from 3, and be blown down 2 to 4, or pass to 5, even to cellar. Here we are inside the house, although a pretentious trap is there placed to bottle up a short length of sewer gas or foul air. I ask, is it wise to have a cellar grid at all so connected to soil-pipe, etc.? Surely this is shown so; and is it necessary, I ask, to fix a trap to scullery sink, where the slop stone pipe can go in line directly to fresh air over a trapped gulley in yard (not so with cellar stone)? The cellar drain can be dispensed with altogether, inside or under the flooring, three or four ways. As the medical officer of health invites criticism, I think before these ideas become local law, or be adopted by the Blackpool corporation, it would be well they be more thoroughly ventilated by sanitary engineers. What if through your columns may be of mutual advantage. We all know, who are daily engaged in such matters, that different places require different appliances, so far as arrangement and construction; and there is no doubt that efficiency and simplicity, with a ready means of examination in all cases, go hand in hand in all true sanitary measures. Complicated 'specialities' should be looked upon with suspicion.

March 5, 1880. E. C. B. T.

RURAL WATER SUPPLY.

What are the best means of supplying houses in a rural district with wholesome water, where the roofs are 'thatch', and the sub-soil blue clay? the only water in the neighbourhood being in ponds or pits, which are fed by surface water? CAMBRIA.

[Water from thatch roofs is quite unfit for profitable use, inasmuch as the impurities due to insect (animal) and vegetable matters which it would contain, are excessive. Filtration by the self-supplying oxidizing filter will do more than any other treatment to rectify these impurities. The water of under drainage may be collected and treated by the same filtration, and made drinkable, but it cannot be converted into water of first-class quality.—ED.]

SELF-ACTING INTERMITTENT SIPHONS.

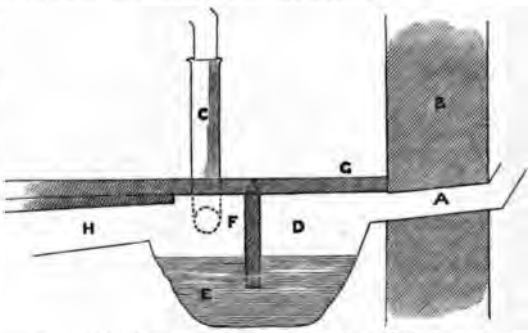
As far as I can understand Dr. Bond's paper on this subject, in last month's SANITARY RECORD, the gist of it is to prove, that if the flow into the long leg of the siphon is not sufficient to fill up the whole of its calibre, the siphon cannot possibly start. It is a somewhat trite, but true saying, that facts are stubborn arguments. If Dr. Bond will call at my office, I shall be happy to show the working model which I exhibited to the British Association at Sheffield, and in which the trickle of water, through a hole about one-eighth inch in diameter, readily starts a siphon with a longer leg, three inches in diameter. Should Dr. Bond wish to see the phenomenon on a larger scale, he can do so at Aylesbury, where a self-acting siphon, ten inches in diameter (used for flushing one of the main sewers of the town), is started by a flow of water altogether insufficient to fill the whole of the calibre of the longer leg. ROGERS FIELD.

VENTILATION OF SEWERS AND DRAINS.

Would you allow me space to call attention to what I consider a safe and cheap plan of ventilating the drains, and, at the same time, of preventing any noxious gas from forcing its way into a house.

Where the drain commences—that is, at the spot where the soil-pipe or house drains reach the outside of the wall of the house—there should be a fair-sized mason's trap or syphon head (I prefer the former), and the outside half of the trap—that is, the half nearest the town and furthest from the house—should be ventilated by a sufficient number of lengths of common iron rain-pipes reaching from the trap to three or four feet above the roof of the house; the soil-pipes should also be carried to about the same height, and be open at the top end.

This diagram will explain my meaning. I have not shown a soil-pipe, as in some cases the closets might be at another part of the house.



B, wall of the house; A, house-drain; H, town-drain; E and D, Mason's trap; E, the outer half ventilated by the pipe C entering it at F.

The hole, F, is shown here, in the position as I have placed it, to show my meaning; but it might be better placed at the top of the half E, of the mason's trap.

The iron pipe, C, need not be a disfigurement to the house; it might be painted the same colour, and would not be noticed. The action of the above system is plain enough. Any pressure on the gas in the town drain, H, would drive it up the pipe, C, instead of through the water of the trap, and into the house drain. The plan is just as easy with every house in a street as with a detached house; and if every house in a street was so protected, the number of these ventilating pipes (one to each house) would prevent the accumulation of noxious gases in the drains.

Local Boards should insist on some such plan being carried out in every house now being built; and it is easy to adapt it to any house, in any locality, even after the house is built.

J. R. T.

P.S.—During this last summer I had the old lead soil-pipes removed from the inside of my house, and a soil-pipe placed outside, of glazed earthenware, running up to about three feet above the roof, with short lengths of the same material running through the wall of the house to each closet. It ends in the yard in a mason's trap, with ventilating pipe, as I have shown in the diagram; and my example has been followed in several instances.

VENTILATION OF SOIL-PIPES AND HOUSE DRAINS.

At page 296 of the SANITARY RECORD for February, I note some remarks by Dr. H. Leslie Jones on the ventilation of soil-pipes and house drains, in which Dr. Jones claims for his friend Alderman Hall credit for inventing modes of draining sinks and water-closets which were invented, described and used long before Alderman Hall or Dr. Jones thought about them, as I have described and practised such modes at least twenty years ago. This, however, would not have induced me to trouble you, as it is no new thing to find old ideas brought up, and claimed as new. My object is to caution Dr. Jones and Alderman Hall against constructing drains within basements, as shown and advocated by them on one of their sections. There should be no such drain within the basement of any house, however 'trapped' or however 'gridded'. The drains should stop at a chamber on the outside of the house wall.

They also show a blundering way of exposing sink-pipes by ending them over an outside grid in place of under this grid, and the sink-pipe should have a light metal flap-trap to cover the end, and prevent indrafts.

The section showing the basement drain (by an oversight) shows no foundation to the wall, which certainly should be below the drain-pipes. The arrangement in the yard, 1—2—3, will be a complicated waste of materials in practice. The trap is not needed; but if formed should have a proper man-hole, not less than 2ft. 6in. diameter, so that it may be of practical use.

Neither the sink-pipe nor the drain outside require trapping, as if sewers are fully ventilated, trapping is a hindrance rather than a benefit. It is possible to over-trap drains—it is not possible to over-ventilate sewers and drains.

ROBERT RAWLINSON.

20th February, 1880.

ON THE VENTILATION OF SOIL PIPES AND HOUSE DRAINS.

I have read Dr. H. L. Jones' remarks at pages 296, 297, and examined his large drawing, published as a supplement, and as he invites criticism upon his ideas, I shall, with your permission, accede to his wishes.

The plans on the sheet of illustrations are dated 29th November 1879, and in publishing them we may fairly ask, 'Are these plans in advance of others already published?' To this question I can only answer that, both as regards efficiency and simplicity, the principal plan shown for the house drain and the soil pipe, is inferior to plans already published and in practice.

The use of the old-fashioned trap, with its branch pipes for ventilation, is a decided mistake; for, by neither the vertical pipe, 1, nor the branch pipe, 2, can the house-side of the trap be seen, nor access got to it without opening the ground. Compare this with the traps at H and O on page 319, and the difference will be at once seen. Dr. Carmichael, in referring to water traps, lately remarked that, 'You should always be able to look down upon the water in the trap so as to be able to see its state at a glance.' Dr. Jones, however, virtually says, 'No, no, keep the water in the trap out of sight, and then if it should be dirty or offensive you will not see it.' That the house-side of Dr. Jones' trap will be both dirty and offensive is insured by its form, as the water will glide into the trap round the curve and leave the fæces floating on the surface of the water. The middle cleansing eye also allows lodgment of the fæces in it, so that Dr. Jones' 'trap' is in reality a cesspool.

Dr. Jones might have got a large amount of information on this subject from the past pages of the SANITARY RECORD, *e.g.*, at page 257 for October 19th, 1877, where illustrations of my 1875 plan, and of that of Dr. George Buchanan, Medical Officer to the Local Government Board, will both be seen, and reference made to the value of the water falling into the trap to keep it clean, and the ventilation and cleansing, both to be done by the same opening, are also shown, Where the water in the trap can be seen, as above referred to, there is also a better chance of being able to judge of the condition of the drain. I further consider Dr. Jones' two openings, 1 and 7, both at the level of the ground, a mistake—the blow-off should be as high as possible above our heads and houses, not under our noses and windows.

The complicated 'soil-pipe broken connection' is no improvement upon Mr. Norman Shaw's style, published in the SANITARY RECORD for January 1878. It would have been both cheaper and better to have simply turned the soil-pipe to one side a bit, and left it open on the top on some such principle as shown at page 93 of the SANITARY RECORD for February 7th, 1879.

It is a mistake of Dr. Jones to omit to ventilate the waste-pipes of the sinks and soil-pipe from the top of the outgo of the trap. This omission causes the lead to give way much sooner, especially where hot water is used. If the air-pipe from the trunk of the water-closet joins the rain-water in the position shown, that is wrong; it should simply go through the wall. One pipe, however, does not ventilate the trunk of a pan-closet; as has been often proved, it requires two. Dr. Jones should know that, and also that stink gathers in this trunk, *per se*, independent of either the soil-pipe or trap. The drain going so far into the house, under the cellar, should be trapped outside.

In concluding my criticisms, I hope Dr. Jones will accept them in good part as those of a practical tradesman whose knowledge of details may be useful to a professional man, who could hardly be expected to know everything about a subject regarding which all have yet something to learn.

W. P. BUCHAN.

21, Renfrew Street, Glasgow.

ORIGINAL PAPERS.

SANITARY NOTES.

By J. Lane Notter, M.D.,
Surgeon-Major Army Medical Department; Assistant Professor of Military Hygiene in the Army Medical School, Netley.

The importance of the proper choice of a site for a habitation cannot be questioned, and, although of almost vital interest, it has too often given place to other governing conditions, such as prospect or convenience, and seldom meets with that attention which it merits, more particularly since recent investigations have so forcibly demonstrated that health and longevity in no small measure are dependent on the quality of the soil on which we build our dwellings. In the following pages the site will refer mainly to the ground actually occupied by the bricks and mortar of the house, without reference to the surrounding plot of land. In towns and cities, unfortunately, the site can seldom, if ever, be chosen. This has generally been settled by persons who have laid out the ground, or by corporations or governing bodies, who map out streets and houses too often by rule of thumb. In every instance, before undertaking such a responsible duty, due consideration should be given to hygienic conditions, the neglect of which is sure, sooner or later, to be fraught with danger to the occupiers. Ample space in front, as well as in rear, should be provided, and this amount will depend mainly on the situation and the aspect. In towns, the width of a street should at least be equal to the height of the houses at either side, and should be sufficient, not only to permit free and uninterrupted circulation of air, but also that sunlight may not be intercepted. This latter condition, if we may judge from the height to which some buildings are carried, especially in London, is completely ignored. Let it be specially remembered, there is no more important condition for the maintenance of good health than that nature's great purifier should not be thus ruthlessly excluded from our dwellings, as is so frequently the case in large cities.

There can be but very few householders who have no choice as to where they shall live, and to those who have, the employment of common sense (for, after all, common sense is the true principle of all hygiene) in the matter of choosing their house is necessary, if they wish to keep themselves from an almost criminal responsibility as regards the welfare of their families. It has been remarked, however, that 'common sense' is the sense which is most deficient amongst the populace, otherwise it would be needless to suggest, for instance, that the immediate proximity to slaughter-houses and gas-works, as well as manufactories where animal refuse is stored, and subsequently utilised, should be avoided. We may mention that this fact appears to be of especial importance, as the only miasm which has as yet been shown to have any special connection with scarlatina is that arising from the decomposition of slaughter-house refuse, as pointed out by Dr. Alfred Carpenter, and subsequently confirmed to some extent by Dr. J. W. Moore. The natural disgust awakened by the obnoxious odours of such localities, as also by those from chemical works and cement factories, in fact, all proximity to trades whose products are noxious to the sense of smell, should be avoided from that fact alone, if for no other. There are localities, however, that the ordinary common sense of our uneducated man will not point out as dangerous, and it is to supply the necessary education in a concise form that these pages have been written. For instance, we would not blame anyone for being unaware that health depends on the character of the ground-water and ground-air beneath his house, if he was totally ignorant of the fact that there were such natural agencies at work. To these, however, we shall refer by-and-bye.

As another example, where ordinary intelligence would indicate the unhealthiness of a site, I may instance that of made land. In towns, too frequently it is the practice to excavate for a new building, particularly if the nature of the soil is gravel, and, subsequently, to fill in with house refuse and all kinds of filth to make a foundation for the intended structure. This is what is known as made land, and a more offensive or unhealthy mixture on which to place a habitation can hardly be conceived. For example, in the made soil in Liverpool Drs. Parkes and Burdon-Sanderson found principally cinder refuse, paper, rotten-stone, etc., and from Dr. Parkes' investigations it would appear that three years was the shortest time that could be given to insure complete destruction of the organic matter, and when we remember the power of resisting disintegration some animal products have, as, for instance, epithelium, 'which remained unchanged in unfiltered Thames water, after a transit in a barrel of eighty miles, and after keeping for five months (Parkes), we must hesitate before we accept such a site as a safe one, even after a lapse of three years, and, certainly, language cannot condemn in terms too strong buildings for habitations being placed on such sites. The organic matter present under such conditions is extremely large, and, although subsequently oxidised and converted, principally into carbonic acid, the enormous amount of this gas present in some soils speaks too plainly of the source of the impurity, and its presence has led Pettenkofer to suggest that the amount be taken as an estimate of the impurity existing in the soil, and which has been oxidised thus far. Some experiments undertaken to investigate this subject have demonstrated the fact that the ground-air contains, in these cases, from 60 to 80 volumes per 1,000 of carbonic acid, an ample proof of the presence of organic matter undergoing change, and, consequently, of the extreme unhealthiness of such sites. It is much to be regretted that the Public Health Act of 1875 made no provision against building on 'made soils', and sanctions the erection of houses and dwellings without reference to the nature and condition of the ground on which the building is made.

In selecting a site in cities, locality also is of paramount importance, and every endeavour should be made to secure an elevated situation, and even in towns this is often possible. If we will only take the trouble to examine statistics on this point, we will find that it is plainly proved that 'zymotic' disease is less prevalent the higher the situation above the level of the sea, a fact which has hitherto been utterly lost sight of in the first instance, and which it is impossible to remedy afterwards. By the term zymotic, which is familiarly known as being the class of disease specially noticed by the Registrar-General in his weekly reports on the health of the community, and from which he draws his conclusions as to the healthiness or otherwise of a locality, must be understood to refer to those diseases, such as scarlatina and small-pox, characterised by specific and distinct features, seldom occurring more than once in the same individual, and the spread of which

is controllable by hygienic conditions. Most of our towns and villages have been originally constructed on the banks of rivers and canals, with, no doubt, the double motive of affording an easy exit for drainage, and a convenient channel wherewith to obtain an efficient water-supply. The increase in the size of these places was dependent on the close proximity to the water, which gave the principal means of transit for stores and produce. The convenience of storage, of residences near for the water-faring population who travel to and fro from these places, all added together to increase the value of property on such sites, and the question of health was never indeed considered, if even, which it probably was, not thought of. Another factor in the spread of zymotic disease is overcrowding or density of population, and this has a direct influence on the health of a locality, for where the population is very large there is almost always sure to follow overcrowding with all its resultant evils. The number of inhabitants should be limited to the area on which they dwell, and this will be mainly governed by the position, drainage, nature of soil, and water-supply. In towns there should certainly be a limit to the specific population (number per unit of area) of a neighbourhood. It is perfectly evident that the mere fact of bringing together a number of people not only tends to increase the spread of disease, for once imported the number of susceptible persons are larger the more numerous the population, and the power of resistance is lessened by breathing the impure air which almost always surrounds such dwellings, as well as the starvation and misery which are never absent. We shall refer to the effects of impure air in a future paper, and note some of the conditions under which it exists. Perhaps, of all the primary conditions (excepting water-supply and drainage) affecting a site, these are the most important, as the other factors which are always present in an unhealthy community are almost certain to follow, namely, pauperism, starvation, dirt, and squalor. The next point for our consideration will be the nature of the soil on which houses are generally built, and its relation to health and disease —this latter point will be considered presently. Rarely, indeed, does it happen that in towns the site is chosen with any special reference to the healthiness or otherwise of the soil. Other conditions far less important are too often paramount, and little heed is given to those who tell us that this forms no small factor in the propagation of disease.

In the country the same conditions seldom, if ever, exist; and the most absolute freedom in choice can in most cases be exercised. How often is it the case that we hear the proprietor of a cottage or mansion expatiating on the view from his windows, and pointing with pride to the fact that he might have built his house in such and such a position (one, perhaps, far preferable for sanitary reasons), only then he would not have been able to secure this view. We need hardly hesitate in fact to say that, as a rule, aspect is sacrificed to the view. It must be within the observation of most people that a site by the side of a lake or stream is not an unusual thing to see selected; and, as a consequence, such a site has, as a rule, high ground behind it, and hills which are the natural feeders of this water channel, and which, moreover, pour down their subsoil water beneath and around the dwelling. No extra care in the construction of such mansions has been taken to counteract the effect of such a choice. Dampness reigns supreme —the view through the low-lying valley affording sufficient compensation to the owner—nor has he ever calculated what sickness or misery the choice of such a site too often entails. As a rule, the surrounding land on one or more sides is undrained. Perchance its dampness is due to its lying below the water level. The house itself speaks too plainly of the site, for dampness crops out on its very walls, and mildew attacks each article within its reach. This, which could, to some extent at all events, have been obviated by a damp-proof course in building, or raising the house itself upon arches, is wholly neglected, and even the walls themselves are often so thin, and the bricks so poor in quality, as to afford but little protection to the wind and driving rain, if the situation is at all exposed. In passing, we may remark few householders who build their own dwellings pay any attention to the quality of the bricks used in the construction of the house. Can we wonder at such a house being unhealthy? It cannot require any great amount of acumen to remember, in a practical way, that water cannot wind its way up hill, or that the more gradual the descent of ground, the more care must be paid to carry it away; and this points to the fact that elevation of a site above the sewage system is here also essential, so as to afford a fall for drainage and subsoil water from the building in one direction at least. Not so evident perhaps, but still not the less true, it must be remembered that in a hilly country a site may be unhealthy owing to its being surrounded by hills, which impede ventilation, and render the air stagnant. Narrow valleys are perhaps unhealthy, as they generally become the channels for cold air, which is especially hurtful at night. In selecting a site in a hilly country, of course the condition of water supply and drainage must be well cared for, as these are an absolute necessity to the future well-being of the occupants; but beyond this care must be taken as to the formation of the ground itself. Thus, steep hills as well as fens and swamps should be avoided, while shelter, too, from prevailing winds should be secured. In regard to the prevailing winds, it must be borne in mind that their direction and force are materially altered by the intervention of a range of hills. No building should be erected with very steep ground behind it; for not only does this raise the subsoil water beneath the house, and by thus increasing dampness renders the inmates subject to colds and rheumatism, but it also intercepts light, and renders the air behind the building stagnant. Nor must it be forgotten that conformation of ground, as well as elevation, is of importance, particularly to persons requiring a mild and equable climate. Both temperature and humidity are influenced by elevation and conformation. The chief points to observe seem to be whether the country is hilly or undulating—the relative amount of high and mountainous land compared with low and marshy tracts—whether ravines or valleys are present, their course and length; the gathering grounds for the local water supply; the physical characters and chemical composition of the waters which flow by the land or rest on its surface; the nature and extent of drainage; what rivers and water channels exist; their extent, incline, and direction. We must remember that although temperature increases with the elevation of the site, this is largely modified by the physical configuration of the country. For instance, places situated on rising ground, or on the top of a slope, are never so cold nor exposed to the full effects of severe frosts; for as the air becomes colder by contact with the cold surface of the ground, both its density and weight are increased, and it pours down

the sides of the mountains to the valleys and lower ground situated below, chilling their surfaces, and rendering them the very coldest and bleakest site for dwellings. The physiological action of elevation and its relation to disease is important; and, from the experience of those who have lived in Mexico and Switzerland, we learn that lofty plains are not favourable to the spread of consumption as a common disease. In fact, we are told that unless imported, it is practically unknown. Respirations are increased, and the humidity of the place diminished, so that the atmosphere is drier. At high elevations there is a disturbance of the heart and lungs, making one very easily out of breath, and bringing on palpitation even on slight exertion.

Certain diseases also appear to have their limits at particular altitudes, such as yellow fever and malarial complaints. From what has been already said, it will be evident that low land and marshes are not only cold in themselves, but that their cold and dampness is consequently increased by the flow of cold air which comes pouring down on them from more elevated places on the neighbouring hills. We can safely recommend an elevated site as being the best in a sanitary point of view, for such will provide not only for adequate drainage, but nature, by her own laws, protects such sites from the full intensity of frosts; and as the conformation is in consequence of the geological structure, it would follow that the best soil on which to build is that situated in these places. In choosing a site we must not only look at the actual form of the ground itself, but, taking a more extended field, inquire into the relative position of the country about it; and if the one which is selected be commanded on any side by higher lands, we must take care that the water and drainage of these may not pass too close, but that ample space and outlet be given for them to flow by at some distance from the building we propose to erect. Little attention hitherto appears to have been paid to the configuration of a country as regards its effect upon health, yet, what few observations have been made tend to show that this has often a very great influence in producing or developing disease. For example, enclosed valleys are bad, if the air is stagnant; but we find that such a condition only exists where the valleys run parallel to the chain of mountains, for, as a rule, the sides of these mountain passes are steep, and often overhanging. On the other hand, the converse of this is exactly true, that is, where they join the chain at right angles, the sides generally slope, and these are not unhealthy. The entrance and exit of these latter, too, are almost always wide, allowing of free perflation of air, whereas the reverse is the case with the former, whose outlets and inlets are narrow, contracted, and often overlapping, enclosing stagnant air, and rendering the a site in a hilly country, the points we have to consider are the height, ascent, and direction of the valleys, whether the sides are steep and precipitous, their entrance and outlet, and principally, perhaps, the relation they bear to the chain of mountains running near. It seems almost needless to say that the very most should be made of the surrounding scenery, and in the construction of a house, the aspect, as well as the prospect, should not be lost sight of. 'Every room,' says Professor Kerr, 'has, according to its particular purpose, not merely a better aspect as opposed to a worse, but a certain limited range of suitable aspect, as opposed to the whole remainder of the compass, more or less decidedly unsuitable. It must be clear, that where considerations of prospect are allowed, and set aside entirely those of aspect (which is often the case), this error of judgment is a grave one. Prospect, even at best, comes in time to lose much of its charm to the eye, which constantly looks upon it. The aspect of a room, on the contrary, if radically unsuitable, will never lose its unpleasantness, so long as the sun goes his accustomed round, and the wind and rain come from their allotted quarters.' As regards aspect, Mr. Eassie tells us that the north is best allotted to the dining-room, as twilight lasts longest there; and the staircases are also best when arranged upon this side of the house, being always cool. For the larder and dairy, this aspect is exceptionally good. The bedrooms will be found most comfortable when facing the north-east, as they get a pleasant morning sun, and are correspondingly cool at night. The east is suitable for the breakfast-room, morning room, and library, but not for the drawing-room, because of the east winds and lack of afternoon sunshine. In the south-east may be placed the reception-rooms and the best bedrooms, and for the sick-room this aspect is not to be surpassed for fitness. The south is unsuited for dining-room windows, unless there be a good verandah; and as for the south-west, it is the worst aspect of all, and unpleasantly hot for bedrooms; neither is the west to be purposely chosen for bedrooms, or even for a dining-room; it is suitable for a smoking-room, or one side of a conservatory.' The north-east is suited for an evening room, if fitted with good blinds. For a study or workroom, a north or north-east aspect is preferable, on account of the steadiness of the light. We need hardly add, that where a bed-room is occupied only as a sleeping-room, aspect is of less importance.

The following table by Mr. Eassie (which I have slightly improved upon), founded on the aspect compass of Professor Kerr, shows the length of time the sun would shine in at any window. By the aid of this table, and a study of the compass, the principal points with regard to aspect will be seen.

Windows.	Sun enters at	Is full in front at	Is lost at	Sunshine March 21.		Sunshine June 21.		Sunshine September 21.		Sunshine December 21.	
				Enters at	Lost at	Enters at	Lost at	Enters at	Lost at	Enters at	Lost at
East	3 a.m.	6 a.m.	10.30 a.m.	Sunrise 6.2 a.m.	10.30 a.m.	Sunrise	10.30 a.m.	8.6 a.m	10.30 a.m.	None	None
South-east ..	4.30 ,,	9 ,,	1.30 p.m.	,,	1.30 p.m.	4.30 a.m.	1.30 p.m.	5.46 ,,	1.30 p.m.	8.6 a.m. Sunrise.	1.30 p.m.
South	7.50 ,,	12. noon	4.30 ,,	7.30 ,,	4.30 ,,	7.30 ,,	4.30 ,,	7.30 ,,	4.30 ,,	,,	3.50 ,, Sunset
South-west ..	10.30 ,,	3 p.m.	7.30 ,,	10.30 ,,	Sunset 6.12 ,,	10.30 ,,	7.15 ,,	10.30 ,,	Sunset 6 ,,	10.30 ,,	,,
West	1.30 p.m.	6 ,,	At setting only.	1.30 p.m.	,,	1.30 p.m.	Sunset 8.8 ,,	1.30 p.m.	,,	1 ,,	,,

place unhealthy. In considering, then, the choice of | The next point for our consideration will be the

relation of the soil to health and disease, and we find this influence occurs in one or other of the following ways:—1. Air in soil; 2, moisture; 3, solid constituents; 4, presence or absence of vegetation; 5, absorption by heat. We shall briefly consider each of these separately, and first—

Air in Soil.—It is, perhaps, one of the most popularly received ideas that there is a limit to our atmosphere. The air we breathe people think extends in an upward course to an almost indefinite height, and practically this is true. It is almost impossible to fix any limit to the height of the atmosphere, because the higher strata are composed only of the very lightest gases, and it is difficult to determine exactly where they end; but a great many persons also hold to the idea that the earth itself places a limit to its downward course. Now this is an error. Every part of the ground not occupied by the permanent ground-water contains air between its particles, nor is this air of constant quality or quantity. As the permanent ground-water rises it presses on it and forces it out, makes the ground expire as it were; when the ground-water falls, a vacuum is formed, which causes an inspiration to take place. The ground-water may be compared to the lungs, for by its rise and fall so changes the air which fills all the little crevices and interspaces which exist between the solid particles of clay, of sand, or rock, which are so situated that they can be effected by the rise and fall of the permanent ground-water. Atmospheric air, then, is always present in the soil, of course, altered considerably by the nature of the media to which it is exposed; it consists principally of carbonic acid, carburetted hydrogen in small quantities, depending on the soil, marsh gas, and sulphuretted hydrogen, and, frequently, putrefying organic matter, which evolve gases akin to sewer gas. The air itself is dependent on the varying level of the ground-water, and the change of temperature; as the water rises it forces out the air, and with it all gases and emanations which are mischievous and unwholesome, and these are eminently assisted by the aspirating effect of a warm house, with no impervious floor to prevent these foul exhalations from being drawn into the dwellings, and which are sucked at an almost inconceivable distance from the sides and neighbourhood of a dwelling as well as from beneath the actual structure itself. The following case, which was reported by Professor de Chaumont in the *Lancet*, of 1873, affords a good example of the suction power of a house built upon a porous soil, and will impress the necessity of ventilation, we hope, on those who have hitherto not paid much attention to the subject. In December 1870, Mrs. B., aged 82, her grandson, 38, and granddaughter, 30, lived in a small four-roomed semi-detached house at Itchen Ferry, opposite Southampton. The gas company recently laid down pipes along this road, and immediately opposite the house a syphon was placed. The pipes were not sunk deep in the ground, and had been there for some months before the gas was turned on—when laid down first they were tested, and were not again examined. In the meantime a severe frost had set in, and this, no doubt, prevented the escape of gas into the air, and sealed up the surface of the ground. The gas was first turned on on December 2nd. No particular smell was noticed in the house, and the family went to bed about 10 p.m. On the morning of the 23rd, as no one could gain admission to the house, the neighbours became alarmed and determined on breaking into the place. On the door being forced open, the apparently lifeless body of the younger woman was found in the passage, and she was the only one who eventually recovered. The dead body of the elder woman was found in the front bedroom, and the man in the back room. The young woman first noticed the smell and endeavoured to reach the door, but failed and fell down in the passage. On examination, the syphon in the roadway was found cracked, and the soil, which consists of loose gravel, between it and the house was largely charged with gas, which passed under the wall of the house and up through the sitting-room floor, for the smell was strongly marked under the floor-planking and in the cupboard. Both rooms were destitute of the means of ventilation, for the windows were closely shut and the fireplaces boarded up and pasted carefully over at all parts with brown paper. At the inquest held at Itchen Ferry, the jury brought in a verdict that the deceased met their deaths from the effects of poisoning by coal gas. In this case the gas passed through the ground for a distance of between 20 and 25 feet, and under the foundation wall of the house. The ground being frozen prevented the escape upwards, and we cannot but observe that the same condition of things takes place in our large cities, where the streets are hermetically sealed up with asphalte pavements, and prevent the free exit into the external air of those deleterious gases which are always present in the soil, more especially of our large towns; and rarely do we meet with gas pipes which do not leak, as any person may satisfy himself by watching for a few moments any portion of our streets which are dug up or in the process of repair.

All these extracting forces are, of course, intensified by the warmth of the house, and especially of the kitchen fire, which is mostly placed in the basement flat, and which part of the building in town is generally beneath the level of the road or street adjoining. External temperature also exercises no small movement in this ground air, promoting its intermixture with the atmospheric air. It must be remembered by my readers that the ground may get heated by day and cooled by night. Heated air, we know, occupies a larger space for a given weight.

The ground will take up cool air to contaminate and exhale it when the temperature is raised. In addition to this, we have constant diffusion or interchange taking place between the air above and the air below the surface; and unless the former have free access to space beyond, the two will become almost mutually foul. In towns especially is the ground air fouled by gas and sewer emanations which come up through leaky pipes: and few can have passed by an excavation of any part of a street or pathway in one of our large cities without having been attracted by the stench emanating from the upturned soil, and which, when sealed over by an impervious layer of asphalte, has no escape save into the basements of our houses, and where the effects are too often visible in the pale and weakened state of the occupiers of these basement flats. While we are improving our streets by sealing them up with wooden asphalte or other pavings, it is a matter of serious consideration whether at the same time we are not rendering our houses more unhealthy. As a matter of fact, the movement of the air in the ground, whether caused by change of temperature or by difference in the level of the ground water, must take place through the houses. We learn from the experiments of Pettenkofer and others, that not only is the amount of carbonic acid in the ground air exceedingly large, but that the proportion of carbonic

acid in ground air is nearly fifty per cent. larger than in ground water.

From what has been said, it will appear evident to any one who is willing to consider the subject a little, why the vicinity of such places as graveyards and cemeteries is unhealthy. For not only is the ground water contaminated, but vapours are given off, and pass into the air, as well as permeating the ground, thus rendering the atmosphere unwholesome, and, if not developing specific disease, certainly adding to the death-rate and sickness. Epidemic diseases introduced under these circumstances are exceedingly fatal, and assume a very violent and unfavourable type. (Parkes, 5th ed., page 133.) It is said that these emanations appear to be especially hurtful during easterly winds, but evidence on this point is wanting. Happily the legislature put an end to intramural sepulture in towns, thus ridding us of this difficulty in making a selection. In country villages the practice still exists, and should certainly be put a stop to.

(*To be continued.*)

NOTES ON INDUSTRIAL DWELLINGS.

By Elijah Hoole.

IV.—CONSTRUCTION.

Ever since the builders at Babel used brick for stone and slime for mortar—a choice of materials in which they are now closely followed by the London builders, especially in the substitute for mortar—local materials have, except in isolated instances, been preferred to those which have needed carriage from a distance. Thus different kinds of construction arise, owing their peculiarities to the diverse character of the materials with which they have to deal. Nor are the various modes of construction left to the choice of the builder of Industrial Dwellings, but are decided for him by the geologic character of the neighbourhood in which he is about to build. He can generally adopt with advantage, and may, sometimes, improve upon the local peculiarities of construction, which are the results of thought and experience applied through a long course of years to the special materials to be dealt with.

Four principal kinds of construction offer themselves for adoption in various neighbourhoods where stone, brick, concrete, and timber are respectively the building materials most readily obtained. Provided it is sound and durable, the material most readily obtained is the best, for, while dwellings for the working classes can be erected and made to pay a fair return upon their cost, it is only by building in the most economical manner that a proper return can be secured. There is no wide margin of profit which will enable the builder in a stone district, for instance, to build in brick and to pay a good dividend. It is occasionally doubtful which material or mode of construction is cheaper in a particular district. This difficulty occurred when some Industrial Dwellings were about to be built at Bristol some years ago, when great difference of opinion was found to prevail among local builders as to whether brick or local stone would prove the cheaper. Brick had to be brought from a distance, while the stone, which was somewhat hard and intractable, might be quarried from the site. A practical test was applied by giving the builder the option of using either material, and it was found that wherever he had to make a choice he always chose stone in preference to brick.

Of the four modes of construction just named, the last, that in timber, must be discarded at the outset. This cannot be done without reluctance, since it affords so many opportunities for picturesque and home-like treatment. But even if its liability to injury, to fire, and to more speedy decay than the other materials mentioned did not prevent its use in towns, the parliamentary and parochial restrictions regulating the erection of buildings would suffice to do so. Stone, brick, and concrete construction remain. Among the advantages of the first of these is the beautiful effect of colour and texture gained by the use of stone, especially in rough rubble masonry, where endless varieties of form and tint may be obtained. That decoration must indeed be exquisite in its working which can compare with the surface formed by the natural cleavage of the stone itself. Nor is the pleasing character of the mode of construction imposed upon us to be either undervalued or ignored. Indeed, it is certain that far too little attention has been given to the need for a home-like appearance in many buildings of this class which, excellent in other respects, altogether fail in this. Without imagining that art can regenerate society, it is obvious that the attractiveness of the working man's house will have much to do with his maintenance of it and of his family, and much influence on his choice between it and the public-house as a place for spending his spare time. If he is to get all the good out of home-life which may be got out of it, he ought to be able to look at his home with pleasure and to take a pride in it. It is, therefore, of the utmost importance that it should be as attractive as possible, both outside and inside. This pleasing character can only be secured by taking advantage of the varieties of form and structure required, so as to obtain good outline and proportion for the entire building, and, by so using the materials at command, that their colour, shape, texture, and whatever other good decorative qualities they have, are shown to the best advantage. Stone construction, if thus treated, can hardly fail to be pleasing; it is, however, attended with some disadvantages peculiarly its own. The walls, if of rubble masonry, must be thick, and thus take up a good deal of space which might otherwise be utilised in the rooms, or in the garden ground. A stone building, at first, at any rate, is apt to be colder than a brick one, and many kinds of stone are very retentive of moisture. The partition walls, flues, and other parts, where great thickness is objectionable, must, after all, be constructed of some other material, such as brick or concrete; but stone, supplemented in this way, will produce a handsome and suitable building at a moderate cost.

Brick construction is more economical of space and material than stone, admitting of thinner walls for the same strength. Though so good an external effect cannot be obtained as when stone is used, yet brick construction, when judiciously treated, leaves little to be desired. It necessitates its own special treatment, and has peculiarities which, if recognised and studied, give opportunities for beautiful effect, as well as for wholesome and convenient planning. Arched construction, decorated with mouldings and terra-cotta ornaments, and enriched with glazed and tiled surfaces, is characteristic of the use of this material, which is susceptible of endless varieties of colour and treatment. When the bricks at command are very porous, or the building is unusually exposed to driving rain, hollow walls are advisable. The thicker external portion is not able to communicate

its moisture to the thinner internal lining, which does not touch it. A very even temperature is also maintained in buildings thus constructed, the temperature of the outer air having much less than the ordinary effect upon the interior. Did not the additional cost of double walls forbid their general use, they would be of great service in the construction of the working man's dwelling, especially where stone is the building material. Stone walls, with a detached lining of brick, would be the perfection of walling for homes of this class.

All internal partitions should be of brick, and no timber should be introduced in them, either with the view of binding them together or of giving a bearing for joists or for other wood-work. The ordinary practice is to insert a timber under each floor of joists, besides inserting an occasional bond timber, as it is called, in the wall. Blocks of wood of the size of a brick are commonly built in to afford fixing for door and window frames. This practice of building timber in is quite unnecessary and cannot be too carefully avoided, as the timber not merely shrinks and causes unsightly cracks but decays sooner than the wall itself, besides affording a harbour for vermin. A wood brick five-eighths of an inch thick will afford sufficient fixing for doors and windows if built in round the openings, and the bond and plates above referred to are best omitted altogether. If the joists require a tie, a stout hoop-iron nailed to their upper sides is quite sufficient. It must be remembered, too, that vermin appear sometimes even in new timber. This phenomenon, so appalling to the careful housekeeper, arises from the fact that the timber has been formed into a raft and floated down to the port from whence it has been shipped to this country. On the raft a hut is built for the man who is in charge, and the purchasers of the timbers which have been immediately under the hut need not be at a loss to account for the remarkable appearance of insect life which often causes them such consternation.

Concrete construction, though useful in almost all situations for foundations, flat roofs, fireproof floors, etc., can only be used economically for the entire building where gravel, or some equally suitable material, is plentiful and cheap. When this is the case concrete construction will be found to offer great facilities to the builder of Industrial Dwellings. The thickness of wall will be the same as for brick construction, to which the general treatment will closely approximate. The exterior may be treated as a kind of rough cast, and decorated with patterns either scratched or stamped upon portions of the surface previously trowelled or floted to receive them, and executed before the cement has set. Sgraffito decoration is also very suitable for concrete buildings, and may be inexpensively executed. A coat of cement, coloured to a dark tint with pounded brick if red be the colour required, or with moulders' sand or ground coke if black be preferred, is first spread upon the concrete wall; a second coat is laid upon it before the first has set, consisting of cement coloured with stone-dust or light sand—this coat should be as thin as possible. Before either coat is hard, and while the cement is easily cut, a design, previously prepared, is traced upon its surface, and is then cut in with an ordinary knife. Wherever the light outer coat is cut through the dark colour below appears. By this means a pleasing and effective decoration, permanent in its character and admitting of the most artistic treatment, may be executed at a small cost. Of course, it should not be too lavishly applied to the building, but should be reserved for certain spaces only, where decoration is most needed and is most effective. This rule, indeed, is of general application to this class of building, but in ordinary cases there is not much danger of its being broken, the margin of outlay for decorative purposes being usually exceedingly small. In buildings of rubble masonry ornament can be altogether dispensed with, since there is usually sufficient variety of form and colour in the material itself; but in almost all other kinds of construction some decoration is required, arising naturally out of the material employed and harmonising with the manner in which it is used.

The varieties of construction previously named are chiefly those occurring in the erection of the walls. In the construction of roofs, floors, ceilings, etc., there is little need for variation. Flat roofs of concrete have been previously named as forming a suitable covering to dwellings of this class. They are constructed by laying wrought-iron rolled girders of suitable strength from wall to wall of the building, at distances of about two feet apart. A floor of boards is then temporarily formed, level with the tops of the girders, and filling the spaces between them. Upon this floor, which has a slight fall either to one or to both sides, a layer of concrete, formed of small pieces of coke and Portland cement is placed, and before this has set it is covered with a coat of Portland cement and sand, well trowelled to a smooth surface, and with a fall corresponding to that of the boards below. After it has set, these boards may be removed, leaving the whole building covered with a slab of concrete supported on the iron beams, as though a large flat stone had been laid over it. A ceiling is formed below the girders, with an air space between, well ventilated by openings to the external air. The rooms immediately below such a flat are not then so hot in summer, or so cold in winter, as those below an ordinary slated or tiled roof.

Floors may be constructed of concrete and iron, in the manner above described, except that the concrete, instead of resting on the top of the girders, may be laid between them, thus reducing the thickness of the floor and increasing its strength. In forming roofs, the concrete is placed on the top of the girders, that the latter may be free to expand or contract without tearing the concrete apart or causing it to crack, which would be fatal to its success as a roof covering. But in floors this is of minor importance, since the variations of temperature are less, and water tightness is not imperatively required.

When concrete floors prove too costly, the ordinary floor of wooden joists will be found to answer well. No doubt fireproof construction is to be preferred when practicable, both for safety and for durability, but as a matter of experience, fires do not occur in dwellings of this class, or if they do, they are speedily extinguished before serious damage occurs, so many persons being always at hand, and water being so easy to procure.

Some cheap and efficient means of excluding the sounds made by the tenants of a room from the rooms immediately above and below them, would add greatly to the comfort of the dwellings in such rooms. Concrete floors will not do this. From their solid and elastic character they rather serve to transmit sound than to stop it, and in a building with such floors, you can hear not only the footsteps in the room above you, but those in the room above that. In wooden floors the ordinary sound boarding and pugging makes a very partial barrier to sound.

A separate ceiling distinct from the floor is the best mode of arresting the passage of sound from room to room, but this is too costly for general adoption, and this difficulty remains to be dealt with. Plaster ceilings are more efficient in excluding sound, dust, and foul air, than boarded ceilings, though they are liable to damage from rough usage from below, and from the careless use of water above. Probably a boarded ceiling, pugged from above, would be the most efficient, if the expense can be borne.

Foundations admit of some variety of construction, especially in cases where the solid substratum on which the building is to rest is far below the surface. In all large cities the present surface is generally far above the original ground level. Various kinds of refuse combine with the remains of earlier buildings, and the ground displaced by them, to raise the surface. Having to form foundations for a block of Industrial Dwellings in London, near Drury Lane, it was found that undisturbed ground was in some parts as far as twenty feet below the surface of the ground, and that it was nowhere nearer than twelve feet. To have made continuous foundations in the ordinary way would have been very costly, as it would have required the removal from the site of a very large quantity of earth for which no place of deposit could have been found for many miles, and would also have involved the use of a large quantity of concrete. So a number of pits were dug, about four feet long, and two feet wide, and were carried down to the solid ground below. When this was reached, and a firm base obtained, the pits were filled up with concrete, nearly to the surface. After this, arches in brickwork were built from one pit to the next, connecting them altogether, and on the arches the walls of the building, which was thus made to stand on a range of concrete piers. Sometimes, it was found better to lay a thick bed of concrete over the entire surface to be built on, so as to distribute the weight over the entire area of the site, rather than to concentrate it upon the spots covered by the piers or walls. The cost of foundations may form an important element of difference in comparing the cost of two buildings otherwise similar in their accommodation and value, and is worthy of careful consideration, both in selecting a site, and in dealing with it afterwards.

ON THE TREATMENT OF SEWAGE.*

BY R. ANGUS SMITH, Ph.D., F.R.S.

I SUBMIT a careful examination of five effluents, the results of processes for the purification of sewage-water by different methods. 1st. From Aldershot, where irrigation alone is used; 2nd, from Coventry, where precipitation by alum and iron is used first, and irrigation afterwards; 3rd, from Birmingham, where precipitation by lime is employed; 4th, from Burnley, where also lime is employed; 5th, from Aylesbury, where the A B C process is used, a precipitant of alum being employed, also of clay. I shall extract from the larger tables some of the more important points; but I wish it to be observed that in this report I refer to quality of effluents only, and not at all to the ultimate value of processes.

Free includes saline ammonia. Its existence is of no disadvantage so far as the effect on the atmosphere is concerned, but its absorption by the soil is important as manure. Its amount indicates decomposition. So far as free ammonia is concerned, the first on the list is Aldershot during dry weather, specimen *b*; Coventry stands second. There two processes are used, both precipitation (with alum, iron, and lime) and irrigation. The next is Aylesbury. The lime processes are certainly behind.

TABLE A.—FREE AMMONIA.

	Ammonia abstracted.		Ammonia remaining.	
	Parts per 100,000.	Per cent. of total.	Parts per 100,000.	Per cent. of total.
Aldershot (*b*)	11.755	97.96	0.245	2.04
Coventry	2.06	79.8	0.523	20.2
Aldershot (*a*)	2.913	80.10	0.747	19.9
Aylesbury	2.980	74.5	1.020	25.5
Birmingham (*a*)	1.425	52.9	1.275	47.1
Burnley	0.120 added	8.3	1.330	91.7
Birmingham (*b*)	0.520	18.8	3.220	118.8

NOTE.—Aldershot (*a*) specimen collected in wet weather; (*b*) in dry weather; Birmingham (*a*) after lime precipitation and irrigation; (*b*) after lime alone.

TABLE B.—ALBUMINOID AMMONIA.

	Ammonia abstracted.		Ammonia remaining.	
	Parts per 100,000.	Per cent. of total.	Parts per 100,000.	Per cent. of total.
Aldershot (*b*)	5.195	98.95	0.0550	1.05
Coventry	1.639	96.40	0.061	3.60
Aylesbury	0.59	89.40	0.070	10.60
Aldershot (*a*)	1.543	88.2	0.207	11.8
Birmingham (*a*)	0.840	80.0	0.210	20.0
Burnley	0.895	74.6	0.305	25.4
Birmingham (*b*)	0.390	37.1	0.660	62.9

On this table Aldershot on a dry day stands best, but not on a wet day. Coventry, with its double system, is next best. Aylesbury, with precipitation alone, is almost the same as Coventry with its double purification. Perhaps this expression, 'on a dry day', is not quite fair, it is meant to show that in a case of an overflow there may be little or no purification, but there is generally some unless the flood be great.

TABLE C.—RESIDUAL AMMONIA.

	Ammonia abstracted.		Ammonia remaining.	
	Parts per 100,000.	Per cent. of total.	Parts per 100,000.	Per cent. of total.
Aldershot (*b*)	11.36	100.0	0.00	0.00
Coventry	5.081	99.8	0.009	0.2
Aylesbury	4.269	88.0	0.581	12.0
Aldershot (*a*)	3.177	83.0	0.636	17.0
Birmingham (*a*)	3.351	61.4	2.109	38.6
Burnley	1.200	29.65	2.503	70.35
Birmingham (*b*)	1.530	28.0	3.930	72.0

Aldershot (dry) is again the best; Coventry next; Aylesbury third. The two chief ammonias in a sanitary point of view are the albumenoid and residual. They are therefore added here

* A Report to the Local Government Board, in preparation of a larger report, by Mr. R. Rawlinson, C.B.

TABLE D.—TOTAL ORGANIC AMMONIA;
i. e., Albuminoid and Residual; both Ammonias may be called 'possible'.

	Ammonia abstracted.		Ammonia remaining.	
	Parts per 100,000.	Per cent. of total.	Parts per 100,000.	Per cent. of total.
Aldershot (*b*)	16.555	99.65	0.055	0.35
Coventry	6.722	98.97	0.070	1.03
Aylesbury	4.859	88.20	0.651	11.80
Aldershot (*a*)	4.720	84.84	0.843	15.16
Birmingham (*a*)	4.191	64.40	2.319	35.60
Burnley	2.095	42.73	2.808	57.27
Birmingham (*b*)	1.920	29.60	4 590	70.40

TABLE E.—TOTAL AMMONIA.

Aldershot (*b*)	28 31	98.9	0.300	1.1
Coventry	8.78	93.6	0.590	6.4
Aldershot (*a*)	7.633	82.7	1.590	17.3
Aylesbury	7.839	82.4	1.671	17.6
Birmingham (*a*)	5.616	60.9	3.594	39.1
Burnley	2.215	34.9	4.138	65.1
Birmingham (*b*)	1.400	15.2	7.810	84.8

It is seen here that the lowest effluent for total ammonia is from the irrigation farm in dry weather; Coventry next; Aldershot (wet) and Aylesbury stand third, nearly the same.

TABLE F.—NITRIC ACID.

	Sewage.	Effluent.
Aldershot (*b*)	. . . . .	9.23
Aylesbury	None . . .	3.19
Aldershot (*a*)	Traces . . .	2.79
Birmingham (*b*)	None . . .	2.13
Coventry	None . . .	1.22
Burnley	. . . .	1.20
Birmingham (*a*)	None . . .	1.16

Nitric acid shows the effect of oxidation on the organic matter, and here the great action of air and of a porous soil shows itself remarkably.

The best seems to be irrigation in dry weather, when the land has full opportunity to act. The use of precipitation has a decided advantage in wet weather, as it raises the purity of the Coventry water above the Aldershot wet specimen. The precipitation method by alum, etc., at Aylesbury, is better in Tables B and C than in A. It is the best of the single processes in wet weather. Aldershot is

TABLE G.

	Date.	Free Ammonia.	Albuminoid Ammonia.
Burnley, collected 16th June 1879.	June 20, 1879	1.33	0.305
	July 17, ,,	1.92	0.23
	,, 28, ,,	1.92	0.30
	Sept. 4, ,,	2.15	0.13
Birmingham, collected 23rd June 1879.	June 25, ,,	3.222	0.662
	July 17, ,,	4.20	0.336
	,, 18, ,,	4.15	0.336
	,, 28, ,,	3.90	0.324
Aldershot (wet) Effluent C	,, 7, ,,	0.44	0.144
	,, 28, ,,	0.364	0.130
	Sept. 4, ,,	0.140	0.092
Aldershot (dry)	,, 16, ,,	0.245	0.055
	Oct. 11, ,,	0.240	0.058
Aylesbury, collected and July 1879.	July 23, ,,	0.96	0.067
	,, 26, ,,	1.00	0.06
	,, 29, ,,	0.96	0.06
	Sept. 4, ,,	0.045	0.035

the best of the single processes in dry. Coventry, the double process, is the best in wet weather. Those which are good in wet weather would, probably, show still better in dry, if the specimens were taken frequently during the year. The precipitation processes, when alum or iron is used, have an advantage in wet weather, since the act of precipitation becomes an act of disinfection. The effluent specimens were examined as to their tendency to putrefy. Those with lime changed most.

Birmingham (effluent) ammonia rose in 23 days from 3.222 to 4.2, then began to fall; Burnley in 27 days from 1.33 to 1.92; Aylesbury changed none in a week; Aldershot (dry) may be said not to have changed in 25 days.

The capacity to froth when shaken is a very useful mode of finding the comparative sewage matter rapidly. It may be said to have been absent in Aldershot (dry), Coventry, and Aylesbury effluents. The clearness of the liquid is very important, although a popular indicator. In the Coventry sample there were a few white floating particles; when these fell the water was clear and colourless. Three specimens—Aldershot (dry), Coventry, and Aylesbury were without colour when they had stood in a large colourless glass vessel.

The total solids are in this order in the effluents; the advantage is in being low, of course:—

Aldershot, average of three (wet) ...	29.5
Aldershot (dry)	41.0
Burnley	54.0
Coventry	70.5
Aylesbury	89.5
Birmingham (*b*)	100.5
Birmingham (*a*)	112.5

During floods the volatile solids stand thus:—

Coventry	12.0
Aylesbury	13.5
Aldershot, average of three (wet) ...	13.8
Burnley	14.0
Birmingham (*a*)	24.0
Birmingham (*b*)	26.5

The chlorine has not been found the same in the effluent as in the sewage. This, I suppose, is owing to the effluent being from sewage of a time previous to that of the specimen of sewage.

The question has been asked which of these specimens is most suited for passing into a sewer. None of these effluents can be called sewer-water in the ordinary sense. The Birmingham stream froths readily, and is not pleasant to the eye. The Burnley water was pretty clear, would do well in appearance as a stream by itself, but caused a milky deposit in the river into which it fell, arising, we may suppose, from the free lime taking up some carbonic acid from the river water and precipitating carbonate of lime. The Coventry effluent went into a stream which was very impure, and it might, so far as appearance went, pass into a shallow mountain stream without being noticed. So of Aldershot and Aylesbury.

In every respect we may say that the best result has been obtained by irrigation when the weather is not so wet as to cause overflowing. Still it was not found highly successful after lime at Birmingham; that the precipitation with alum or alum and iron compounds is next; that in wet weather there is an advantage in precipitation, because the action is largely, if not wholly, independent of dilution; that the lime process is valuable, but not equal to the

above precipitation processes. I must repeat that, in this report, I allude only to the merits of the effluent. There is a good deal to be examined before pronouncing on the ultimate value of the processes, and, of course, a large proportion, if not all, of the remaining reasoning, must be left for Mr. Rawlinson.

Analyses of Specimens of Waters from Sewage Works, expressed in Parts per 100,000.

Samples from Burnley, collected 16th June 1879.

	Organic Carbon.	Free Ammonia.	Albuminoid Ammonia.	Residual Ammonia.	Total Ammonia.	Nitric Acid.	Sulphuric Acid.	Chlorine.	Mineral Solids.	Volatile Solids.	Total Solids.	Alkalinity as SO_3.	Hardness. Before boiling.	Hardness. After boiling.
Stream above sewage works	0.476	0.025	0.024	0.075	0.124	0.50	3.26	1.28	17.0	3.0	20.0	7.50	10.81	7.78
Do. below ditto	0.987	0.236	0.070	0.219	0.525	0.56	4.12	1.90	18.5	6.5	25.0	9.00	12.64	8.22
Crude Sewage	20.33	1.45	1.20	3.703	6.353	—	6.35	5.12	49.0	148.0	197.0	13.00	—	—
Effluent from sewage works	3.737	1.33	0.305	2.503	4.138	1.20	7.38	5.06	40.0	14.0	54.0	13.00	20.92	17.16
Samples from Birmingham, collected 23rd June 1879.														
Crude sewage	20.44	2.70	1.05	5.46	9.21	None	25.23	24.16	102.0	75.0	177.0	13.83	45.0	44.0
Effluent from settling tanks	4.09	3.22	0.66	3.93	7.81	2.13	22.65	15.78	74.0	26.5	100.5	11.32	39.0	38.4
Effluent after irrigation	2.303	1.275	0.21	2.109	3.594	1.19	18.19	11.46	88.5	24.0	112.5	37.77	66.8	29.22
Samples from Coventry, collected 24th June 1879.														
Crude sewage	11.33	2.58	1.700	5.09	9.370	None	11.33	6.85	59.0	31.0	90.0	25.35	32.80	9.85
Effluent from settling tanks (filtered)	1.418	2 40	0.245	0.511	3.156	None	7.21	6.30	55.0	16.0	71.0	22.34	37.15	15.62
Effluent after irrigation (drain out of order)	0.587	2.12	0.205	0.895	3.220	1.22	13.21	5.73	58.0	19.0	77.0	12.62	35.45	17.65
Sample from Coventry, collected 10th July 1879.														
Effluent after irrigation	0.618	0.52	0.061	0.009	0.590	1.62	13.39	4 99	58.5	12.0	70 5	21.0	40.70	19.72
Samples from Aldershot, collected 1st July 1879 (wet weather).														
Crude sewage	16.90	3.660	1.750	3.813	9.223	Trace	2.04	4.38	41.0	32.0	73.0	9.40	6.71	3.38
Effluent 'A' from sewage farm	—	0.920	0.276	0.803	1.999	2.69	5.14	4.54	24.0	16.0	28.0	2.50	6.57	6.29
Effluent 'B' from sewage farm	2.282	0.880	0.200	0.788	1.868	1.59	1.89	3.14	15.0	11.0	26.0	1.90	5.00	4.57
Effluent 'C' from sewage farm	2.240	0.440	0.144	6 318	0.902	4.08	2 40	3.20	20.0	14.5	34.5	0.70	7.86	6.86
Collected 13th September 1879 (dry weather).														
River Blackwater	0.536	0.0108	0.03	0.0542	0.095	1.56	2.40	2.46	32.50	6.00	38.50	20.40	28.55	10.88
Crude sewage (camps)	43.76	12.00	5.25	11.36	28.61	—	4.29	12.08	48.0	93.0	141.0	16.40	11.70	4.43
Effluent from sewage farm	0.970	0.245	0.055	—	0.286	9.23	4.48	15.53	24.5	16.5	41.0	Nutrl.	12.28	12.00
Samples from Aylesbury, collected 2nd July 1879.														
Crude sewage	6.76	4.00	0.66	4.85	9.510	None	14.42	7.97	76.0	29.0	105.0	35.50	48.6	20.0
Effluent from third settling tank	0.633	1.02	0.07	0.581	1.671	3.19	30.21	5.44	76.0	13.5	89.5	11.20	66.40	37.1

ON THE DESIRABILITY OF A STATE SANITARY MEDICAL SERVICE.

By Herbert A. Lawton, L.R.C.P. Lond., M.R.C.S. Eng.,

Medical Officer of Health to the Poole Urban, Port, and Rural Sanitary Authorities.

It has often occurred to me, both before and since I have been a Medical Officer of Health, how open to abuses and unsatisfactory is the present system of appointing Medical Officers of Health. Many have been appointed from personal, social, political, and false economical reasons. A friend of mine, who has since proved himself a very efficient health officer, owes his appointment to his and his father's interest with the county magistrates, who formed a considerable part of the electing authority. My own urban appointment was a political one—there is and was a Liberal majority in the Town Council of Poole. When a vacancy occurred three candidates (all Conservatives) applied, but the election was practically confined to two; one received the Conservative support, while I, being then in partnership with a leading Liberal town councillor, received the Liberal support, and, therefore, the appointment. I very much doubt if our testimonials were even read. Then, again, many officers are appointed, in order to comply with the Act, at very small salaries, and are really expected to do nothing.

The proper performance of one's duties is beset by difficulties. If the Health Officer is appointed for a combined district, and debarred from private practice, should he happen to offend one of the combining Authorities it can withdraw from the combination, and the officer's salary being thereby materially reduced, he is left either with an inadequate income or is again thrown on his own resources to recommence life. Should the Health Officer be also a general practitioner, he is beset by other difficulties; he may either offend his Authority or the general public who form his *clientèle*, should he happen to interfere with so-called 'vested interests'; in addition to these difficulties, he is very often not kept informed of epidemics, etc., by his fellow practitioners, either from jealousy or disinclination on their part. Next, with regard to the termination of the tenure of office. The Health Officer may find himself at the expiration of his short term of office superseded by some one else,

who undertakes to do the work for a less salary, or who gains the post from social or political influences. In the case of a combined district, he may be stranded by the several districts dissolving the combination. Surely this state of affairs needs reform and re-establishment. The wonder is that so much sanitary reform has been effected by Health Officers when they are so heavily handicapped.

Having spoken of the evils of the present system, the next thing is to suggest a remedy. The remedy I venture to recommend is, that the Government should take the Sanitary Medical Service into its own hands, in the same manner as they do the Army and Navy Medical Services. By this means, the mode of appointment and tenure of office would be free from the present objections. The necessary machinery would be a Health Department, consisting of a Minister of Health, with staff of Medical Inspectors and Medical Officers of Health. The Medical Officers of Health should receive adequate salaries to compensate them for being debarred from general practice, and proportionate to the extent and population of their district. Towns over a certain population should have two or more Health Officers. At a certain age Health Officers should retire, and receive pensions proportionate to their length of service. To begin with, very many of the present Medical Officers of Health would be available to fill the appointments, and they should be appointed, provided they could show that they had done good work and were conversant with their duties; for it would hardly be fair to expect them to submit to examination, considering that very many of the ablest Health Officers have no special qualification in sanitary science. But subsequently all candidates should be required to pass an examination in sanitary science. Then, again, I would suggest that the Health Officers should be practitioners of not less than four years' standing, and twenty-five years of age. However well diplomaed a newly qualified man might be, he would be less likely to make an efficient Health Officer than one who, having been in actual practice, had learnt to treat disease practically, and, by association with all classes and ages, was acquainted with the various diseases to which each class is liable; besides which, nothing but actual practice can make one thoroughly proficient with the origin and propagation of disease and the peculiarities of localities. Under this system, Medical Officers of Health would be responsible to the Health Department, and its inspectors should periodically visit and inspect each Health Officer's district and work.

The promotion or moving of Health Officers to better salaried localities should be according to seniority combined with merit and ability, but this, as well as salary, are matters of detail.

I hope that these rough remarks will show the desirability of a State Sanitary Medical Service, and that some more experienced and able Medical Officers of Health will further develop this scheme.

NOTES ON THE SMALL POX EPIDEMIC AT BIRKENHEAD IN 1877.

By FRANCIS VACHER,
Medical Officer of Health, Birkenhead.

WHEN a district has been visited by an outbreak of a zymotic disease which has proved wide-spread and fatal beyond all recent experience in the locality, it behoves the medical officer in charge, after he has made his formal report to his authority and the central board, to consider well how the experience which he has gained in observing and dealing with the visitation, may be made available for others. Every epidemic has its own story, teaches its own special lessons, contributes its share to existing statistics; and particulars regarding it cannot fail to be interesting to all engaged in the practice of public medicine. Now this, I take it, is especially true, as regards every small-pox epidemic (the disease being admittedly preventible), and it is with reference to a small-pox epidemic I have now to solicit attention. I have styled what I have written 'notes', because it is necessarily fragmentary. The points I have sought to bring forward are mainly :—1. The initial cases being concealed cases. 2. The special prevalence of the disease among children and young persons. 3. The especial fatality of the disease among the unvaccinated. 4. The length of time between the first sense of illness, and the appearance of the eruption. 5. The length of the incubation period. 6. The position of those affected in the families to which they belonged, their sex and occupation.

I. In 1877, the district of Birkenhead, in common with many other districts, urban and rural, suffered from an epidemic of small-pox. The last local epidemic was between May 1870 and October 1871, the resulting deaths being then 23; since which but two deaths have been referred to the disease—one in August 1874, and one in September 1876. From time to time sporadic cases are introduced into the district, by ships putting into dock, or from Liverpool or other Lancashire towns; but as prompt advice of such cases is nearly always received, the isolation of the infected subjects, and the other repressive measures adopted, have again and again proved sufficient to prevent the spread of the disease. But during the last week of the year 1876 no less than seven cases were notified to the authority; and as for upwards of four weeks before, no case had been reported or come to the knowledge of the sanitary or parish authority, and the only remaining cases of those previously noticed were isolated in hospital, it seems certain that one or more of these seven originated the outbreak. Of the seven, two were reported on December 25th, one on the 26th, one on the 27th, two on the 28th, and one on the 29th. The second, third, and fourth cases reported, appeared to have been removed to hospital almost as soon as recognised, while the fifth and sixth were transferred to the union hospital after the lapse of one day. The remaining two, the first and last reported, were deliberately concealed. The first, which I shall call the Cleveland Street case, was not reported till it had been received into the union hospital. The history of the case is as follows :—The patient was a barmaid in the employ of her aunt, who kept a small public-house in Watson Street. On or about December 19th, while living in this house, she sickened with small-pox, and on the 24th, being then very ill, she went home to her mother, who rented a room in a large sub-let house in Cleveland Street. Here she remained but one night, admission to the union hospital being obtained for her next day, but the result of the one night's lodging was that on January 11th, a younger sister (a child aged 8 living with the mother) sickened with small-pox, and she in turn communicated the disease to the mother, who manifested a well-pronounced eruption on January 26th. Meanwhile, a servant employed in the public-house in Watson Street, who had all along occupied the same bedroom as the

barmaid, began to show signs of being infected, and on January 3rd, there being then no doubt about the nature of the disease, the landlady became alarmed, and made arrangements with a charwoman to receive the patient. On the night of the 3rd the patient was lodged at the charwoman's house in Kinmel Street, from which she was removed to the parish authorities on the 4th. There was no subsequent case in this house, but on the 20th, a lad living in the same street, and not many doors off, was reported ill with confluent small-pox, and though proof is wanting that this lad was in the company of the infected woman or those who received her, it is at least a remarkable coincidence, that about a fortnight after the woman visited the street (which is a very small one) the rash began to appear on this poor lad. There can be little doubt as to the motive which influenced the public-house mistress in acting as she did. Her house was doing a brisk Christmas trade and she did not wish to spoil it. Clearly the patients must be got rid of; but had she applied to have them removed to the fever hospital she would have had to pay maintenance charges in respect to them; and had she appealed to the parish authority, there might have been some difficulty in effecting the transfer, at all events in the case of the niece. The easiest and simplest course to pursue was to shift the burden from her own shoulders to those of others, and this was done twice successfully as I have shown.

The other case I have referred to, and which I shall call the Conway Street case, although it did not come to the knowledge of the sanitary authority till December 29th, appears to have sickened about a week before Christmas, the eruption being first visible on the 22nd. The lower portion of the premises in which this case occurred, had unfortunately been opened as cocoa-rooms a day or two before the disease declared itself; and apart from this, the house was one in which a concealed case of small-pox was almost certain to do mischief. On Sundays a Sunday school was held there, and on various days in the week it was used as a meeting-house by Foresters, Good Templars, a trade society, a co-operative society, and three tontine clubs. Here, as in the cases originating in Watson Street, a medical man had been called in, and small-pox was recognised; but the disease was considerably modified by vaccination, and the friends may on this account have been blinded as to the risk incurred. On the representation of the sanitary authority, the house was at once closed, and the patient isolated as far as practicable; but on January 12th, that is just fourteen days after the closing of the house, a young woman who lived with the family and assisted in the business, showed the characteristic rash, and was transferred to the fever hospital. Whether the concealed case in Conway Street was the means of spreading the disease to any of those who frequented the house before it was closed, is difficult to ascertain; but that the small-pox was thus communicated is extremely probable, and in one instance a patient's friends attributed a fatal attack to visits to the cocoa-rooms, and no other source of infection could be traced. This case was reported on January 11th, admitted to the union hospital on the 12th, and died on the 21st. These brief particulars of cases, which were deliberately concealed, need no comment. The necessity for a measure making timely information of cases of infectious disease compulsory, has been frequently represented. Facts, such as I have just recorded, show that the demand for assistance in this respect from the Legislature is reasonable. The two cases in Watson Street, slily hustled away to two virgin houses, and the case hidden in the upper story of the busy house in Conway Street, were all in medical charge, and had been correctly diagnosed. I could cite many other instances where the subjects of small-pox have been concealed, but in those I have brought forward concealment was probably exceptionally mischievous.

II. The next point I am desirous of calling attention to, is the especial prevalence of the disease among children and young persons. The total number of cases coming to the knowledge of the authority in 1877, was 603—190 being reported during the first quarter, 313 during the second quarter, and 100 during the latter half of the year. In four cases only the age of the affected subjects was not ascertained. On arranging the ages in tabular form, it was found that 5.3 per cent. of the whole number attacked were infants under one year, 5.6 per cent. were one year and upwards, and under five years, 47.5 per cent. were five years and upwards and under twenty, and but 40.7 per cent. were twenty years old and upwards. It was also noticed that the proportion of adults to the whole number of cases reported gradually declined. Thus, in the first quarter of the year, the proportion of persons twenty years old and upwards, to the total of persons reported during the quarter, was 44.7 per cent., during the second quarter of the year, it was 40.5 per cent., and during the latter half of the year it was 34 per cent. The percentage of children and young persons among those attacked does not, however, fairly indicate the special prevalence of the disease among the young, as in nearly all localities the adults outnumber those under twenty years of age. To ascertain the relative susceptibility to attack of infants, children, young persons, and adults, as indicated by the Birkenhead epidemic, it is requisite to compute the number of infants, children, young persons, and adults, in the local population, at the middle of the year. This is a comparatively simple matter, as the exact number coming within each age period appears in the last Census return, and there is no reason to believe the local population is not essentially the same, in this respect, as it was at the date of enumeration. On this basis, we find that out of every 1,000 infants under twelve months, 16.6 were attacked with small-pox, that out of every 1,000 children one year old and under five years, 5.3 were attacked, that out of every 1,000 children and young persons turned five years, and under twenty, 15.9 were attacked, and out of every 1,000 twenty years old and upwards, 8.8 were attacked. Not a single person of sixty years old or upwards was attacked, although it is estimated there were 2,316 persons of this age living in Birkenhead at the time of the epidemic. The large proportion of infants affected is manifestly due to the relatively large number of them unvaccinated, 27 out of a total of 32 under one year old being unvaccinated, and one vaccinated only five days before the appearance of the rash. It is fair to add that 21 out of the 32 were but three months old or under, 8 being under four weeks. Of course the fatality of the disease among infants attacked was enormously high —22 (*i.e.*, 68 per cent.) dying.

III. This brings me to the third subject — the especial fatality of the disease among the unvaccinated. It is much to be regretted that the information obtainable, as to the protected or unprotected state of the affected, is not more precise. Such information as I have, consists of extracts from the registers of the two local hospitals, and the register

of the unremoved cases, and is summarised in the following table:—

Destination and Result.	Vaccinated.	Not Vaccinated.	Unknown.
Fever Hospital	87	15	4
Union Hospital	43	19	33
Not Removed	93	38	183
Total Recovered.....	223	72	220
Fever Hospital	5	9	0
Union Hospital	2	10	15
Not Removed	5	34	13
Total Died	12	53	28

The particulars are far from complete, but so far as they go it is believed they are quite reliable. Thus, as regards the patients admitted to the fever hospital or treated at home, those entered as vaccinated displayed undoubted cicatrices, as attested by competent medical witnesses, and those entered as not vaccinated were admittedly unvaccinated, or without the faintest mark. The mere assertions of patients or their friends, that they were vaccinated, counted for nothing, as about 80 per cent. of the patients entered in the third column of the table were reported as having been vaccinated in infancy. The testimony of the table in favour of the value of vaccination as modifying small-pox, may be thus stated:—Out of 515 patients who recovered, 223, or 43.3 per cent., were known to have been vaccinated, and 72, or 13.9 per cent. were known to have been unvaccinated; whereas, out of the 93 patients who died of the disease, 12, or 12.9 per cent. were known to have been vaccinated, and 53, or 56.9 per cent. were known to have been unvaccinated. It is hardly necessary to say, that in many of the vaccinated subjects, the operation had been only partially successful. The analysis of the vaccination of the 87 vaccinated patients who recovered at the fever hospital, is as follows:—12 showed each one faint mark; 24 showed each two faint marks; 11 showed each three faint marks; 1 showed four faint marks; 7 showed each one distinct mark; 10 showed each two distinct marks; 8 showed each three distinct marks; 6 showed each one distinct mark and one faint mark; 5 showed each one distinct mark and two faint marks; 2 showed each two distinct marks and one faint mark; 1 showed two distinct marks and two faint marks. The analysis of the vaccination of the 5 vaccinated patients who died at the fever hospital is as follows:—2 showed each one faint mark; 1 showed two faint marks; 1 showed five faint marks; 1 showed one distinct mark.

IV. What is the length of time between the first sense of illness and the appearance of the eruption? This is a question which, I think I may venture to say, observers of small-pox epidemics have hitherto taken little trouble to determine. Certainly I know of no trustworthy statistics on the subject. It occurred to me at the commencement of the outbreak, that either the patient or those in charge of him would generally be able to say when the first sense of illness was perceived. Accordingly, in the sheets for registering the cases as reported a column was introduced, headed 'Date when patient sickened', the next column being headed 'Date when eruption began', and I have found that in the majority of cases information was forthcoming to enable me to make entries in both these columns. Of the 603 cases known to the authority no less than 526 furnished particulars [redacted] the date of sickening and the date of the commencement of the eruption. In one case the first sense of sickness was referred to fourteen days before the first indication of the eruption, and in one case to eight days before. This is the extreme limit. In none of the other cases did the period between sickening and eruption exceed one week, while it rarely exceeded four days. In 17 cases the first sense of illness was referred to the day on which the eruption began to appear, in 175 to the day before the eruption, in 166 to two days before, in 100 to three days before, in 40 to four days before, in 14 to five days before, in 4 to six days before, and in 8 to seven days before. That is to say, 3.2 per cent. of the patients furnishing particulars were either not ill before the appearance of the eruption, or ill for only a few hours before; whereas in 33.2 per cent. illness preceded the eruption by one day, in 31.5 per cent. by two days, in 19.0 per cent by three days, in 7.6 per cent by four days, in 2.6 per cent. by five days, and in 2.6 per cent. by a longer period.

V. What is the length of the incubation period? is a far more momentous question than that just considered, and it has received much more attention. The result is that authorities on the subject are nearly agreed; still, any evidence in this connection is instructive and useful. The period of incubation of an infectious disease is exceedingly difficult to determine. Indeed, the opportunities for fixing the date when any particular subject received the contagium of small-pox are very rare. If, therefore, out of the many hundred cases of small-pox observed by me during 1877, I am able to settle satisfactorily the incubation period in three or four cases only, I shall esteem myself fortunate. As the sources of error multiply with the spread of the disease, I have turned my attention especially to some of the early cases. But first let me define what I understand by the 'period of incubation'. With some writers it means the period intervening between the receipt of the morbific principle into the system and the supervention of distinct symptoms. Now, as a rise of temperature of 3 or 4 degrees is a distinct symptom, and may precede the eruption, I prefer to define the incubation period as the time between exposure to infection and the commencement of the eruption.

All five of the following cases were seen by myself, the three last mentioned coming under my own charge. In all the eruption was discrete. From careful observation I am able to establish, with tolerable certainty, the facts given in column 4:—

Name of Patient. 1	Age 2	Vaccination Particulars. 3	Time between exposure and commencement of eruption. 4
Sarah B.	8	2 faint marks	19 to 20 days
Mary B.	44	1 faint mark.....	13 days
Eliza O.	10	3 distinct marks	13¾ days
Margaret M. ..	13	No mark	13 to 15 days
Sarah H.	40	1 distinct and 1 faint mark ..	17 to 18 days

Had I been asked what was the incubation period of small-pox at the commencement of the epidemic, I should have answered that my experience and reading led me to believe that it was nearly always from twelve to fourteen days. In deference to my further experience from the recent epidemic, I think my answer to such a question would now be 'nearly always from twelve to twenty days'. I submit the record merely as a record, and knowing it actually proves very little. In any of the cases, for aught I know to the contrary, the poison may have been

received into the system less than a week before it manifested itself; and inasmuch as no one can say the communicableness does not commence before the eruption, some of the cases may have been infected even before their infectors showed any cognisable sign of being affected.

VI. Finally, I have to speak of the position in their respective families of those affected, as distinguishing bread-winners from dependents, and the occupations of the same, as indicating their social position. Of the whole number of patients reported 338 were males and 261 were females, while in four cases the sex was not recorded. I took some pains to ascertain the position of these patients in the families to which they belonged. Of the males 68 appear as heads of houses, or parts of houses, 180 as dependents, or in part dependents, and 72 as lodgers; of the females 57 appear as wives or mothers (seven being nursing mothers), 168 as daughters or dependents, and 17 as lodgers. As regards the occupations of those reported as suffering from small-pox, particulars were not returned in every case; and the returns made include such a variety of occupations it is not easy to group them effectively. Among unskilled workers no less than 48 are described simply as labourers, and 35 as dock labourers, 9 as railway servants, 7 as policeman, 7 as porters, 9 as cart or van drivers, and 6 as car drivers, coachmen, or grooms. In going over the occupations of the women affected, I find no less than 35 described as servants. As 8 only were received from houses in which they were in service, the remainder must have been out of place at the time they were reported. Seven are described as shop assistants, 4 as dress-makers, 2 as milliners, 3 as seamstresses, 3 as bar-women, 3 as small shopkeepers, and 6 as chipsellers, and 24 young women were described as 'helping' at home. The number contributed by the local denominational schools to the sum of the subjects affected was, as indeed might be expected, very large. There were 2 assistant teachers, one belonging to each sex, and 113 scholars, of whom 52 were boys and 61 girls.

Thus it appears that an overwhelming majority of the sufferers in this epidemic were derived from the labouring class, and the remainder (six only excepted) from the artisan class. The six exceptions are a doctor, a clergyman, two clerks, an insurance agent, and a shipbroker. The few instances in which particulars as to occupation were not ascertained were, for the most part, parish cases, so that had the return been complete it would scarcely have affected this conclusion.

THE PRESENCE OF ARSENIC IN COMMON THINGS.*

By Dr. Stevenson Macadam,

Lecturer on Chemistry, Edinburgh.

Fully eighteen years ago I drew special public attention to the extensive employment of arsenical green colouring matter in ordinary wall paper-hangings, which contained from 1 to 40 grains of arsenic in each square foot of paper. Taking 20 grains of arsenic as an average proportion, an ordinary large-sized room with 1,000 square feet of wall surface would thus have 20,000 grains of arsenic, and an ordinary small-sized room with 500 square feet of wall surface would have 10,000 grains of arsenic covering the walls. Such arsenical colouring matter is in most cases more or less loosely adhering to the surface of the paper, and the dusting and rubbing down of the walls are liable to detach the pigment as a fine powder, which becomes diffused through the atmosphere of the room, and temporarily settles on the carpet, bedclothes, bed and window hangings, cornices, etc., liable to be disturbed again by the next dusting operation, any alteration of the bedclothes or hangings, or even during the airing of the room. The arsenical dust might thus be inhaled in every breath. Possibly, also, the alternate damping and drying of the wall paper in such a room, which always takes place from time to time during occupancy and non-occupancy, and even during fluctuations in the humid condition of the atmosphere, may tend to vaporise the arsenic into the atmosphere of the room. I have repeatedly tested the dust from the cornices, etc., of rooms papered with the arsenical paper-hangings, and have always found more or less arsenic in the dust.

During the last year my attention has been specially directed to the great prevalence of green colour in textile fabrics, paper for labels and boxes, artificial flowers, children's books and toys, and other common articles, and I resolved to investigate how far the green colour was of an arsenical nature. In a very large proportion of the articles examined arsenic was found more or less present, often in small quantity, but occasionally in very large proportion. The preliminary trials were made by Reinsch's process, taking care to have a blank experiment throughout, and, thereafter, various articles were selected for the purpose of the determination of the quantity of arsenic present in such. The quantitative analysis was carried on by treating the article with a dilute solution of hydrochloric acid, containing one part by volume of the acid to eight parts of water. After heating and filtration, the arsenic and copper were precipitated by a stream of hydrosulphuric acid, and the liquid filtered and the precipitate washed. Thereafter, the mixed sulphides were treated with dilute ammonia, the solution evaporated to dryness, the residue acted upon by nitric acid, again evaporated, dissolved in water, and the resulting arsenic acid treated with ammonia and ammoniacal sulphate of magnesia solution. The precipitate thus obtained of the arseniate of magnesia and ammonia—

$$2(MgNH_4AsO_4)H_2O$$

was dried on a weighed filter, and the arsenic calculated therefrom into arsenious oxide.

Working in this way, I examined three samples of thin gauze cloth which were coloured of a light green tint. These cloths gave me the following results, calculated to the square foot of each of the cloths:—

	Arsenious Oxide obtained from the square foot.
No. 1 Cloth	31.72 grains.
No. 2 „	11.60 „
No. 3 „	26.60 „
Average of three samples. .	23.31 grains.

These cloths are sold for cheap ball dresses, and for trimming dresses, and are often used for covering gasaliers, mirrors, etc., during summer weather. The price was sixpence to a shilling a yard, and consequently for a few pence a large amount of

* Read at the Meeting of the North British Branch of the Pharmaceutical Society, Jan. 22, 1880.

deadly material could readily be purchased. Indeed, taking ten yards of cloth of 36 inches wide as a reasonable amount in a dress, there would be present in such a dress 90 square feet, each containing on the average 23 grains of arsenic, or in all fully 2,000 grains of arsenic. Such an amount is enough to startle any one, not only in the fact of its being present in the cloth, but also in the readiness with which the poison can be so procured.

Again, I examined a large number of green coloured papers, more or less glazed, and used in covering pasteboard boxes, and in making printed and other labels for articles of food, drink and general merchandise. Indeed, a large proportion of band-boxes sent out by milliners, hatters, etc., of toy boxes, and of shop labels and tickets, are more or less covered with this green paper. Three samples were taken for quantitative analyses, and they yielded as follows:—

	Arsenious Oxide obtained from the square foot.
No. 1 paper	45.40 grains.
No. 2 „	35.98 „
No. 3 „	16.22 „
Average of three samples. .	32.53 grains.

Taking the average amount of 32 grains of arsenic in the square foot, a small-sized band-box with three square feet of green surface will have about 100 grains of arsenic. An ordinary-sized cracker-box with one and a half square feet of green surface will have 48 grains, whilst the small cracker-boxes, specially fitted up for children, have a square foot of green paper and 32 grains of arsenic. Even the papers of the crackers themselves are often green and arsenical, and yield 2 to 3 grains of arsenic each. The labels on tinned meats are often green and arsenical, and yield from 6 to 20 grains of arsenic each. Indeed, you can scarcely purchase a bottle of any liquid or solid article of food, delicacy or stimulant, at the present time, without running the risk of getting at least one poisonous dose of arsenic on the label affixed to the bottle or package, or even on the paper in which the article is wrapped up.

I have likewise found the same poisonous green pigment on envelope wrapping bands, each containing 1 to 2 grains of arsenic; in children's picture and story books, containing at least 50 grains of arsenic; in concert and ball-room cards and tickets, in artificial flowers, water colour paints, children's toys, etc. Indeed, the present rage for green colour seems so general that it is a rare thing to find a shop window where arsenical green is not present on the paper of the shelves or walls, the labels and tickets on the articles, and the wrappers or boxes containing the wares.

In domestic use also the green colour has lately invaded the size tinting of kitchens, presses, and rooms which are size painted. Emerald green, which is sold in every painter's shop to all and sundry at a few pence per lb., contains, as analysed by me, fully 50 per cent. of arsenic; and size green, which is also sold to every one at as cheap a rate, contains from 2 to 14 per cent. of arsenic, according to the depth of the shade of green. I have tested the size colour as supplied and put on by painters on the walls of kitchens and other rooms, and have calculated that from 7 to 36 grains of arsenic are present in every square foot of wall surface.

In this communication I have limited my analyses and observations to those cases in which the arsenic was present as arsenical green in large quantity. I am aware that the same poison is present in other colours and in other states of combination than as the arsenite of copper (Scheele's green), and the aceto-arsenite of copper (Schweinfurt green), and it is probable that I may return to the subject again. But in the meantime, enough has been said to show the great prevalence of the poisonous arsenical green in common things. It scarcely admits of question that such ready means of acquiring deadly material should not be allowed in any country. Independently of the question of accidents occurring from children sucking or even eating articles containing the poison, or of parties being affected by the arsenical wall papers, or wall size paint, there is the facility for carrying out murderous designs, which ought not to be placed in the hands of a community, or be left to chance for malicious people not to take advantage of. There seems little use in a Poison Act to restrict the sale of comparatively small doses of poison, when every one can purchase in any painter's or drysalter's shop about half a pound of arsenic in the form of emerald green for sixpence, and at least a quarter of a pound of arsenic in green paper-hangings for the same money; and where, without making any direct purchase at all, any one can obtain from an old meat can, a bottle label, a grocer's wrapper, a child's picture book, a worn-out artificial flower, or a piece of an old band-box, as much arsenic as will enable him to inflict deadly injury upon himself or his neighbours.

Noxious trades cannot be carried on where the atmosphere or the water supply of a community are affected injuriously thereby, and it would seem reasonable that the wholesale trade of disseminating over the country vast quantities of arsenic should be equally amenable to and be suppressed by the strong arm of the law.

THE

SANITARY RECORD.

APRIL 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

LOCAL SANITARY LEGISLATION.

THE ramifications of local legislation are rapidly becoming so extensive, that it is almost impossible to follow them. Originally designed for the purpose of meeting felt local wants which could not conveniently be dealt with by a general Act, local bills have been and are being used for the purpose of making all sorts of unnecessary alterations in general enactments, which are of very doubtful utility, and usually only serve to confuse. It is little short of marvellous how such alterations are placidly passed by the Houses of Parliament, with apparently no effort being made to see that they are necessary or desirable. The Local Government Board does, indeed, report upon all these local bills, but its re-

commendations are adopted or ignored in the most capricious fashion by the small committees of members having charge of such bills, and the general body of the House of Commons is too weary with its own work to pay any heed to the matter. It has come, therefore, to pass that many of these local bills are simply examples of the ingenuity of the draughtsman, who has incorporated in them as many changes in the general law as his fancy could devise. Probably this peculiarity is most marked in the non-sanitary clauses of local bills; but even in those which profess to deal with the general laws relating to the public health, there are certain which are open to great objection, as unnecessarily altering, with no commensurate advantage, a law which, when enacted, was intended to be of general application, and not to be locally altered at the caprice of one town clerk or another. It would be an unprofitable task, however, to go minutely into the arguments for and against these local changes, and we must, therefore, content ourselves with a few comments on the direction in which these local bills appear to be drifting, as regards the taking of further powers for the prevention of the spread of infection.

There are at the present moment six local bills awaiting the decision of Parliament which contain clauses of a medico-sanitary nature, viz., Birkenhead, Huddersfield, Lancaster, Oldham, Preston, and Stafford. All these bills include sections providing for the compulsory notification of infectious diseases, and all but Stafford clauses having a much wider scope. As to the notification of infectious disease, there is but little to remark beyond what we have already said in previous articles on the subject. It is clearly desirable, in the interests of sanitary progress, that this requirement should as much as possible be encouraged; but it is, nevertheless, important that it should proceed upon right lines. The method of reporting which seems least open to objection is that the occupier shall be regarded primarily as the person to give the notice, and that the medical attendant on any case of infectious disease shall give the certificate to the owner, for transmission by the latter to the Sanitary Authority. This plan, which gets over the difficulties which have been pointed out by the British Medical Association, has, however, only been hitherto adopted at Huddersfield (1876), Nottingham (1878), and Norwich (1879). An inferior plan, but one that has been much more largely followed, is that of making it compulsory both on the occupier and on the medical attendant to give notice to the authority. This is now in force at Bolton (1877), Jarrow (1878), Llandudno, Warrington, Blackpool, Rotherham, Leicester, and Derby (1879), and is proposed to be adopted this year at Stafford. A still less satisfactory plan is that which requires the occupier only to give notice when a medical man is not called in, which has been adopted at Burton-on-Trent (1878), Blackburn (1879), and is proposed for adoption this session at Birkenhead, Lancaster, and Preston. Worst of all is the Edinburgh clause of 1879, which imposes a duty only on medical attendants, and which is thus likely to encourage the calling in of quacks and unregistered practitioners, or delay in calling in medical advice at all.

The clauses which seem to call more particularly for present comment are those which Birkenhead, Huddersfield, Lancaster, Oldham, and Preston propose to adopt, giving the authorities power to provide shelter-houses for families in which infectious disease has appeared, power to provide nurses, power to order the closure of schools and other places of public resort, and of shops, dairies, or other places for the sale or storage of provisions, clothing, or other articles, and power to take means for preventing the entrance of the public into such places, or the issue from them of food, clothing, or other articles, as well as power to declare a particular locality as an infected place, and to enforce certain stringent regulations therein. Thus no person living in any house declared infected may continue at any indoor occupation which necessitates the handling of any clothing, food, or article likely to retain infection, which is intended for sale, or for the use of persons belonging to another family. No bedding, clothing, or other articles liable to retain infection may be removed from such houses without previous disinfection, or without proper precautions for the purposes of being disinfected. These powers are copied from those conferred by Parliament upon Jarrow in 1878, and upon Blackburn and Derby in 1879. It will be observed that there runs through the whole a trustfulness of being able to check contagion by a species of quarantine—a revival in a measure of the ridiculous ideas as to infection that prevailed in the early part of the century. The powers seem, indeed, to be regarded more in the light of supersession of the Public Health Act than as adjuncts to it. It cannot be too strongly insisted upon that such powers as these should not be exercised until the powers given by the Public Health Act have been exhausted. Any different view than this, any leaning upon powers of closure and powers of domestic quarantine instead of on the ordinary statutory powers of the Public Health Act, can only be productive of mischief. It is difficult to say precisely when it may be proper to clothe authorities with extended powers such as these; but they certainly ought not to be given with an unthinkingly generous hand, nor until an Authority has given earnest of satisfactory activity in ordinary sanitary work. The possession of a properly-equipped hospital for the isolation of cases, of a disinfecting apparatus, and of an organised sanitary staff, should at any rate be indispensable preliminaries to the granting of such powers. Parliament cannot well be the umpire on these points, and it would seem worthy of consideration whether the Local Government Board—which alone of central bodies can have the knowledge requisite for the formation of a proper judgment in this matter—should not be given an absolute power of veto in the case of any proposed

local amendment of the general sanitary law. If the alterations which are now being made continue to increase, it will be difficult to tell what is the sanitary law in force in any place that is wealthy enough to push through a local Act of Parliament.

That some vague notion of quarantine is present in the minds of these local authorities is apparent from the further alterations proposed to be made at Huddersfield. The clause empowering the provision of shelter-houses is omitted, but, *en revanche*, surgeries and offices of public vaccinators may be closed, as well as places for the sale of beverages by retail, and common lodging-houses.

No one dwelling in an infected house may, unless with written medical permission, and after disinfection of the person and clothing, work at any other place in the same room as healthy persons, and no nurse attending on any person suffering from infectious disease may attend as nurse on any other person without the same restrictions. The Bill proposes, moreover, to subject to the penalties of section 126 of the Public Health Act any person who, after being exposed to infection by contact with, or having charge of, or attending as nurse upon a person suffering from infectious disease, enters a public conveyance without having previously taken proper precautions against spreading such disease, or without previously notifying to the person in charge of such conveyance the fact of such exposure. The same penalty is imposed upon the person in charge of the conveyance who, after receiving such notice and conveying such person, does not immediately provide for the disinfection of such conveyance. Any person who uses a public carriage other than a hearse for the conveyance of the corpse of a person dead of infectious disease, without notifying the fact to the driver; and any owner or driver of such conveyance who does not immediately disinfect the same, will be liable to a penalty. It seems difficult to understand what can be the motive for inserting clauses such as some of these, except that Huddersfield has a mania for long-winded local bills. The interference with social life that all this would entail must be obvious; and it is, indeed, doubtful whether some of the clauses could be made to work at all. It will be interesting to learn, when the Bill comes up for discussion, what the Local Government Board has to say, for instance, on the proposal to allow no one to go to business from an infected house without medical permission, and disinfection of his person and clothing, or to allow a nurse, attending on an infectious case, to nurse no one else without the same precautions. To make regulations such as these, is clearly to begin at the wrong end altogether.

There is but one other matter in these local bills that seems now to need comment at our hands, viz.: a proposal in the Lancaster, Oldham, and Stafford bills, for altering the procedure in cases of compulsory removal to hospital. At present, under section 124 of the Public Health Act, 'any person who is suffering from any dangerous infectious disorder, and is without proper lodging or accommodation, or lodged in a room occupied by more than one family, or is on board any ship or vessel, may, on a certificate signed by a legally qualified practitioner, be removed by order of any justice, to such hospital or place, at the cost of the local authority'. By a section in the Warrington Local Act of last session, which has now been copied by the three authorities above stated, whenever, on the certificate of the officer of health or other legally qualified medical practitioner, that any person suffering from infectious disease is without proper lodging or accommodation, enabling the case to be properly isolated so as to prevent the spread of the disease, or to be properly treated, the corporation may give notice to the head of the family (resident in the same building) to which the sufferer belongs, requiring the removal of the patient to hospital forthwith. If the person to whom such notice is given consents, the corporation may forthwith remove the sufferer; but if he refuse, or is incapable of giving consent, any justice may, on the application of the corporation, make an order for removal. The advantages to be gained by the intermediate threat of the corporation, before recourse is had to the justice, are not immediately apparent; indeed, the section seems calculated more to delay action in cases where every moment is of importance. There is, however, one advantage in the clause—that it clears up an ambiguity which has been felt in some quarters to attach to the words 'proper lodging or accommodation'. These words, are, it will be observed, extended so as to give power of compulsory removal in cases where the lodging or accommodation is not only improper for the patient himself, but improper also for those surrounding him.

It will be manifest, from what has been said above, that a great many alterations have locally been, or are proposed to be made in what, when it was passed, was intended to be a law for the whole kingdom. We do not know of any precedent for allowing an authority in any part of the kingdom to override general law in favour of one which it thinks better, and which it is enabled to have its own way about by enshrouding it in a local bill. Yet this is exactly what is now going on in the local bills to which we have called attention. Obviously, if these changes are desirable at all, they are desirable for the kingdom at large; and the proper way would be to alter the Public Health Act on a broad basis, rather than to tinker it locally in the present haphazard and irresponsible fashion.

The Town Council of Coventry have agreed to renew the lease of the City Sewage Works to the Rivers Purification Association Limited, for a further term of four years, at an annual subsidy of £2,200.

The Drapers' Company recently voted to the Parkes Museum of Hygiene a donation of fifty guineas; and now it is announced that the Clothworkers' Company have voted a similar sum to the same institution. This is the second donation from the Clothworkers' Company.

NOTES OF THE MONTH.

THE CULTIVATION OF SEWAGE FARMS.

All authorities agree that Italian rye-grass is the most powerful absorbent of sewage, and that its growth should form a prominent feature in every sewage farm. In the report presented by Messrs. Rawlinson and Read, to the President of the Local Government Board in 1876, it is observed (p. 29), that, 'Italian rye-grass is, probably, in all respects, the most advantageous crop to be grown under sewage, as it absorbs the largest volume of sewage, occupies the soil so as to choke down weeds, comes early into market in Spring, and continues through Summer and Autumn, bearing from five to seven cuttings in the year, and producing from thirty to fifty tons of wholesome grass upon each acre'. The rye-grass plants will last for two years, and, if carefully managed, for three years, without losing their absorbent and productive powers. On this point, Dr. Alfred Carpenter says: 'The great fault at the Beddington Sewage Farm, of the Croydon Local Board, has been that the rye-grass has been allowed to flower, by which the root has been weakened, and rendered only one-half effective for its work. This ought never to be. It reduces the value of the second crop by one-half, and prevents a third year's cutting altogether.' The cuttings of rye-grass (the first of which can be made early in March) are very tender and succulent, and, in moderation, form excellent green food for cows and horses. The difficulty is to find a sufficient market for this produce. In a dry season, when grass is scarce, this difficulty may not arise; but, in a moderately wet season, when ordinary grass is plentiful, the rye-grass cuttings are not so much in demand, and they have to compete with tares and clover, which many prefer. Then, again, the rye-grass cuttings will not keep, nor bear long carriage; nor can the rye-grass be made into hay with advantage, owing to the great quantity of moisture it contains, and the damp state of the ground on which it is grown. These causes involve greater labour and costs in making the grass into hay, and the produce is not worth quite so much as ordinary meadow hay. As a rule, corn crops do not thrive on sewage, in a great measure because they cannot do with the moisture incident to its use; but, after being three years in rye-grass, the land should be ploughed, and sown with corn for one year, so as to absorb the elements of sewage that have not been taken up by the rye-grass. No fallows are necessary.

WEATHER TELEGRAMS.

Sir James Ramsden, of Barrow-in-Furness, has proposed to the Council of the Meteorological Society to establish and maintain, at his own expense, a telegraphic reporting station at that place. The council have accepted this munificent offer. The reports will possess especial value from the proximity of Barrow to the recently established station at Hawes Junction, as the difference in level between the two stations is about 1,000 feet.

VERTICAL TUBE VENTILATION.

As the result of a trial which took place on the 24th ult. in the Chancery Division of the High Court of Justice, and in which the purchasers of the Tobin patents for ventilation sued to set aside the sale of the inventor's patent, on the ground that they were induced to purchase it by fraudulent representation and by the concealment of facts which he ought to have disclosed, Vice-Chancellor Malins decided that the plaintiffs had failed to make out their case; but that they were entitled to have a reduction made from the £3,000 paid in respect of the purchase, owing to the invalidity of the French and the lapse of the Belgian patent. Probably this was much what the public expected, after all the laborious examinations made into the matter during the fortnight which the trial lasted. Still it is very unfortunate that his ship did not decide the question as to whether the patent was really a patent or not, in the sense of its holding water as against all other manufactures of the kind, as it would then have been an interesting decision. As it is, the matter is just left where it was. In our issue of the 5th of April 1878, we expressed our own opinions as to the claim for the priority of this system of ventilation, and we still adhere to what we there stated.

WORKHOUSE HOSPITALS AND SANITARY AUTHORITIES.

A curious example of the way in which sections of Acts of Parliament may be perverted from their proper use is afforded by a recent discussion at the meeting of the St. Albans Board of Guardians. Section 14 of the Poor Law (Amendment) Act of last year provides for the transfer of hospitals connected with workhouses to the Sanitary Authority, the clause referring of course to existing buildings. But the Guardians propose to erect a building as guardians (thus spreading the cost over the whole union, including the urban district of St. Albans), and then transfer it when constructed to the Rural Sanitary Authority. Under any circumstances this arrangement must come for sanction to the Local Government Board, by whom it will inevitably be rejected; but it shows how strangely wrong Local Authorities may go in their interpretation of Acts of Parliament.

THE ISOLATION OF INFECTIOUS DISEASE.

The advantages of hospital accommodation for infectious disease are forcibly shown by two cases which recently came before the notice of the Health Committee of Birmingham. In the one instance, scarlet fever had broken out at the Blind Institution, Edgbaston, and three of the inmates were successively attacked. These cases were at once removed, as they occurred, to the Borough Hospital, and are progressing satisfactorily. No other case has occurred at the Blind Asylum, and thus, by the immediate removal of the affected cases to the hospital, what might have been a very serious outbreak has been confined to three patients. In the other case, scarlet fever had broken out at one of the workhouses, and was assuming very grave proportions. The Guardians had not the necessary accommodation for the isolation of the patients, and ultimately no fewer than eighteen were removed to the Borough Hospital. Since then no further case has occurred at the workhouse.

POISONOUS PAINTS.

We read that at Ramsgate, Oswald Puckeridge, a retired publican, was sentenced to six weeks' hard labour for causing the death of a valuable dog. The

offender painted the dog all over with the Liberal and Conservative colours, and the animal was poisoned through licking the paint off. It is a pity Mr. Puckeridge was not aware that non-poisonous pigments are to be procured, he might then have indulged his peculiar form of artistic taste without inconvenience to himself or injury to the animal decorated.

SOMETHING TO BE PROUD OF.

Dr. F. Barry, the late Medical Officer of Health for the Craven combined district, Yorkshire, now Principal Medical Officer of Health for Cyprus, gives, in his report for 1879, just issued, the reasons for the chief causes of the spread of infectious disease in his district, apart from defective sanitary conditions. He defines them to be (*a*) utter carelessness on the part of parents in the case of children, and of the patients and their friends in the case of adults; this being probably increased by a kind of fatalism, they believing that if a thing must be, it must, and that it is useless to attempt to interfere with the designs of Providence. (*b*) Ignorance, and a belief that it is necessary for every individual to pass through a certain round of diseases, and until this is done a child is like a puppy that has never had distemper. He instances an amusing example of this feeling which came under his notice one day last summer when travelling by rail. Two respectably dressed men got into the carriage, and began to talk over the respective merits of their children, something as follows:—First man: 'One of my lads is a very fine one. He's had measles and scarlet fever as well.' Second man (with great contempt): 'Call that a boy! Why, I've a boy who's had the small pox, and the typhoid fever, and the measles, and the whooping-cough, and the scarlet fever, and now he's gone and got the dropsy! Now that's what I call a boy, that is.' (Utter collapse of the first man.) Dr. Barry also relates how, when he was inquiring into an outbreak of measles in a village, and going into one of the two shops, found a child suffering from the measles. He remonstrated with the mother for exposing the child in such a public place. Her reply was that as her child's measles were such a good sort, she had sent round to the neighbours to bring any children who had not yet had it, so that they might take the infection. When Dr. Barry informed her that if she persisted in this benevolent work she would be prosecuted, the good lady was greatly surprised. A similar experience with regard to measles happened to Dr. Goldie of Leeds, as we noted at the time, in the SANITARY RECORD for April 5, 1878.

THE WATER-SUPPLY OF GROWING TOWNS.

In his last annual report Mr. Wilton, the energetic Medical Officer of Health for Gloucester, draws attention to a matter which has lately pressed itself upon the minds of many health officers in different parts of the kingdom; the danger, namely, attendant upon an insufficient supply of water to growing towns. For the last five years Mr. Wilton has been urging upon his Authority the necessity of making extended provision for meeting the increased and steadily increasing demands which are being made in Gloucester city for a supply of this necessary of life. The number of houses connected with the city water system is constantly increasing, no less than 535 houses having had the water laid on last year. Yet no increase has been made in the quantity supplied to the city, though it appears that even when the number of persons using the water was several thousands less than at present, it became necessary to give, for a long period, an intermittent supply when the summer was only moderately dry. The inconvenience of this has, of course, been greatly felt by householders, especially amongst the poor, who have no means of storing water; and there is, moreover, a grave danger of the sucking of infected air into the pipes during the intermittence of the supply. A Committee of the local Authority has, indeed, been appointed to consider what steps should be taken for securing an additional supply; but no practical result has followed its appointment. Under these circumstances, we can but endorse most strongly Mr. Wilton's earnest recommendation that additional water should at once be supplied to the city, and his regrets that this has not been done long before. A very serious responsibility rests upon the Gloucester Town Council whilst the present state of affairs is allowed to remain. A very similar story to that of Gloucester comes to us from Hexham, where the supply of water has been grossly insufficient for a number of years. Dr. Jackson, the medical officer of health, to whose plain speaking we have before adverted (vol. x, p. 374), thus refers to the subject in his last annual report. After speaking of the very sparing amount of flushing of the sewers which is possible, in consequence of the very limited supply of water in the public reservoirs, he says the reservoir has been frequently found barely sufficient to supply the household requirements of the inhabitants, the quantity of water in it having several times been reduced so low as two or three days' supply without any water having been used for flushing. He then goes on to show that when no flushing took place infectious diseases broke out in the town, and truly observes that 'a perfect system of public sewers without a sufficiently abundant supply of water is a delusion and a snare, a fertile source of disease laid on to every house instead of a promoter of public health.' The death-rate of Hexham is persistently excessive, and Dr. Jackson considers that a factor in this excessive rate is the neglected state of the sewers. No further progress can, he thinks, be made to a more healthy condition until the supply of water at the disposal of the local board is so copious that the sewers may be kept perfectly pure without the continued dread of producing a water famine. Dr. Jackson protests firmly against the last and most fatal step in the reactionary course now being pursued by the board, 'that of closing the nearly completed negotiations for securing a more plentiful supply of water. By this ill-advised proceeding the gradually expanding town of Hexham, in which the removal of excreta by water carriage has been generally adopted, lies exposed to a calamitous outbreak of fever whenever the atmospheric conditions are favourable to its development.' No words of ours could add to the force of these spirited sentences, which will, we hope, not be without their effect upon the local authority.

NEW GENERAL ORDERS OF THE LOCAL GOVERNMENT BOARD.

An important series of general orders has just been published by the Local Government Board, altering in certain essential respects the orders with regard to the appointment and duties of health officers, which were promulgated in November 1872,

and have remained in force ever since. All medical officers of health and inspectors of nuisances appointed or re-appointed after the 25th March last will be subject to these new orders instead of to those of 1872. In addition, the Local Government Board have taken the bold step of prescribing the qualification and duties of medical officers of health whose salaries they do not partly repay, and over whom therefore they have up to the present had no control. They have based this action upon an obscure clause at the end of section 191 of the Public Health Act, which provided that the Board might 'by order prescribe the qualification and duties of other medical officers of health appointed under this Act'. This they have apparently taken to mean that they might prescribe the qualifications and duties of all officers of health, which they have accordingly done. It remains now to be seen how local authorities, who do not ask for repayment of their officers' salaries, will relish this mine, which has, as it were, been sprung upon them. As to the duties themselves, which we give in full on a subsequent page, there is nothing to observe; but the principle of seeking to control such appointments as these savours somewhat of undue centralisation. No alterations worth mentioning are made in the duties of inspectors of nuisances, except that they are to inspect places were milk is sold, and to give notice to the medical officers of health of the occurrence of any contagious, infectious, or epidemic disease, the words 'of a dangerous character' being omitted. It will be seen, however, from the duties laid down for medical officers, that an important change is made in the subordination to them of the inspectors of nuisances. It is significant and encouraging that throughout the orders the words 'salary or remuneration' are substituted by 'salary', the alteration having evidently been prompted by the complete failure of the system of payment by fees.

FAMILY PREDISPOSITION TO DIPHTHERIA.

In a report on the recent outbreak of diphtheria amongst the children in the Ludlow workhouse, Dr. Thursfield draws attention to a remarkable instance of the apparent predisposition in some families to contract diphtheria, and to suffer severely from it. At the time of the outbreak there were amongst the children in the school seven children, all members of one family, all of whom were affected with the disease, and three of whom died. Singularly enough, these were the only three fatal cases out of the thirty-two attacked.

THE PUBLIC HEALTH

DURING MARCH 1880.

The temperature during March showed a general excess; it was, indeed, above the average on 22 of the 31 days in the month. The mean temperature of the month at the Royal Observatory, Greenwich, was 44°.3, and exceeded by 3°.4 the average March temperature in 100 years. Rain was measured on but four days during the month at Greenwich, to the aggregate amount of only 0.6 of an inch, which was an inch below the average March rainfall 61 years. The sun was above the horizon during 366.9 hours of the month, and 141.0 hours of bright sunshine were recorded. The month was exceptionally sunny; for in the corresponding month of the three years 1877, 1878, and 1879, the recorded sunshine did not exceed 99.3, 73.1, and 91.0 hours, respectively. Easterly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, and containing a population of seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 26,897 births and 16,048 deaths were registered during the five weeks ending 3rd April. The births were equal to an annual rate of 37.4 per 1,000 of the estimated population in the twenty towns; the birth-rate was equal to 38.3 in London, while it did not average more than 36.6 in the aggregate of the nineteen provincial towns. The deaths registered in the five weeks of March were equal to an annual rate of 22.3 per 1,000, against 26.0 and 29.0 in the two preceding months. The March death-rates in these towns in 1877, 1878, and 1879 were equal to 26.8, 24.0, and 28.2 per 1,000 respectively. The public health in our large towns during last month, judged by their mortality statistics, was therefore considerably more favourable than in the corresponding period of any of the three preceding years.

The lowest annual rate of mortality during March in the twenty towns was 16.9 in Brighton. The rates in the other towns, ranged in order from the lowest, were as follow:—Portsmouth, 17.2; Wolverhampton, 19.1; Bradford, 20.3; Leeds, 20.6; Sheffield, 20.8; Bristol, 20.8; Leicester, 21.0; Birmingham, 21.1; Norwich, 21.6; Sunderland, 22.0; London, 22.1; Hull, 22.3; Salford, 23.5; Norwich, 23.6; Liverpool, 24.3; Oldham, 26.4; Manchester, 26.5; Nottingham, 27.8; and the highest rate during the month was 31.3 in the borough of Plymouth. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate in March averaged 22.6 per 1,000, while in London the rate was 22.1. The death-rate in London, therefore, did not show during March the excess that had prevailed during the four preceding months. The high death-rates in Plymouth, Oldham, and Nottingham, were mainly due to the epidemic fatality of measles; while that at Manchester was not caused by excessive zymotic mortality.

The 16,048 deaths from all causes in the 20 towns included 2,354 which were referred to the seven principal zymotic diseases; 926 resulted from whooping-cough, 538 from scarlet fever, 432 from measles, 168 from diarrhœa, 164 from fever (principally enteric), 80 from diphtheria, and 46 from small-pox. These 2,354 deaths were equal to an annual rate of 3.3 per 1,000 in the 20 towns during the five weeks under notice, against 3.8 and 3.9 in the two preceding months. In the 19 provincial towns the zymotic rate was 3.1 per 1,000, and in London 3.4. The annual death-rate from these diseases during March did not exceed 1.1 in Brighton and 1.2 in Portsmouth, whereas it ranged upwards in the other towns to 5.2 in Oldham, 5.9 in Nottingham, and 10.9 in Plymouth. Whooping-cough was again the most fatal zymotic disease in the 20 towns during March. This disease caused 638 deaths in London and but 288 in the 19 provincial towns. The fatal cases of this disease also showed excessive proportions in Salford, Plymouth, and Newcastle-upon-Tyne. The fatality of scarlet fever was proportionally largest in Sunderland and Leeds; of measles in Plymouth, Nottingham, Hull, and Oldham. The deaths from measles were but 96 in London, while in the 19 provincial towns, with but a slightly larger population, they were 336. Of the 164 deaths from fever in the 20 towns, 71 occurred in

London and 93 in the other 19 towns. The greatest fatality of fever again occurred in Sheffield, where 26 fatal cases were recorded. Diphtheria was more fatal in London than in the 19 provincial towns; 52 of the 80 deaths referred to this disease being recorded in the Metropolis. Of the 46 fatal cases of small-pox in the 20 towns, 45 occurred in London and one in Bristol, while in the 18 other towns no death from this disease was registered. The metropolitan asylum hospitals contained 172 small-pox patients at the end of March, against 80 and 163 at the end of January and February. The weekly number of new cases of small-pox admitted to these hospitals during March averaged 39. During the three preceding months they had averaged 11, 20, and 50 respectively. Judged by these figures it may be presumed that the prevalence of the disease in the metropolis is again on the decline, although it is still noteworthy, especially in contrast with the comparative immunity from the disease enjoyed by the rest of England and Wales.

The fatality of diseases of the respiratory organs (excluding phthisis) during March showed a marked decline from that recorded in the preceding months. The weekly number of deaths referred to these diseases in London, which had been 702, 571, and 932 during December, January, and February, declined to 350 in March, which was equal to an annual rate of 5.0 per 1,000. The death-rate from lung diseases varies to a considerable extent in different towns. In those of the 20 large towns furnishing returns to our table the rate during March ranged from 3.9 and 4.0 in Portsmouth and Bradford to 6.0 in Nottingham, and 6.6 both in Oldham and Wolverhampton. The difference between the rates from these diseases in two south-west towns is also noteworthy. It was 3.9 in Portsmouth and 5.1 in Plymouth.

In the outer ring of suburban districts around London (having a population little short of a million of persons) the annual death-rate from all causes during March did not exceed 15.5, and the zymotic rate was but 2.1 per 1,000. In inner or registration London the corresponding rates were, as before stated, equal to 22.1 and 3.4 per 1,000 respectively.

The number of urban sanitary districts for which uniform mortality statistics are given in the accompanying table is 174. In the corresponding tables for the eight preceding months the number of contributing sanitary districts steadily increased from 36 to 162. On the last day of March 201 post-cards were sent out to the medical officers of health of as many suburban sanitary districts, including 29 new applications. Of these 201 cards no less than 174 have been returned, the statistical information furnished by which is published herewith. We regret to say that only nine of the twenty-nine new applications have at present met with a satisfactory response, but further promises of co-operation in future encourages the hope that the number of sanitary districts embraced by our monthly table will continue to increase. We take this opportunity gratefully to acknowledge the ready and punctual co-operation of so many medical officers of health, and especially for their response to our appeal to return their cards as soon as possible after the close of the month. The considerable labour involved in the preparation of this table for publication is thus materially facilitated.

The estimated population of the 174 sanitary districts for which we publish March statistics in the accompanying table is rather more than seven millions of persons, and if we include London and its outer ring of suburban districts, it would amount to eleven millions and a half. The annual birth-rate in those districts furnishing the number of births averaged 36.5 per 1,000, against 35.0 and 35.4 in the two preceding months. The returns for a single month in small districts scarcely afford a satisfactory basis for the calculation of trustworthy annual birth-rates for comparative purposes. It may be noted, however, that the birth-rate during March was exceptionally low (below 22 per 1,000) in Tiverton, Withington, Truro, Liversedge, and Cheltenham. It was, on the other hand, unusually high (exceeding 50 per 1,000 in Redditch, Nuneaton, Chiswick, Workington, Runcorn, Morley, Widnes, and Bradford (Lancashire).

The annual death-rate during March in the 174 urban sanitary districts averaged 21.8 per 1,000 of the estimated population; the average death-rates in the contributing sanitary districts during the three preceding months were 25.2, 24.2, and 23.8 per 1,000 respectively. The average rate in the twenty large towns, including London, was 22.3 per 1,000 during last month; it follows, therefore, that the death-rate in the smaller urban sanitary districts was considerably lower than in the larger towns. The annual death-rates during March were satisfactorily low, and under 15 per 1,000, in Redditch, Banbury, Bromley (Kent), Willenhall, Finchley, Heywood, Dover, Ulverston, Ilfracombe, Brentford, Guildford, West Derby, and Widnes. Excessive death-rates, exceeding 30 per 1,000, were recorded during March in Altrincham, Plymouth, Newbury, Droitwich, Carnarvon, Ashton-under-Lyne, Bridgwater, Tredegar, Bradford (Lancashire), and Keighley. With regard to the statistics for the urban sanitary district of Bradford (Lancashire), they are strongly suggestive of an under-estimate of the present population. Between 1861 and 1871 the population of this sanitary district increased from 3,523 to 7,168, and it appears probable from the figures in our table that the present population is greater than 15,000, at which it is estimated by the medical officer of health. Several of the high rates of mortality above quoted were in great measure due to excessive fatality of zymotic diseases; in many cases, however, they are not susceptible of this explanation.

The annual death-rate from the seven principal zymotic diseases in the 174 sanitary districts averaged 2.8 per 1,000, against 3.1 and 3.0 in the two preceding months. The death-rate from these diseases in the twenty large towns averaged 3.3 per 1.000. No death from any of these seven zymotic diseases was registered in 28 of the 174 sanitary districts; the zymotic death-rate showed, however, a proportionally large excess in Redruth, Ilkeston, Gorton, Littlehampton, Altrincham, Plymouth, Rochester, Bradford (Lancashire), and Bangor. Small-pox caused eight more deaths in Bath, and one each in Ashton-under-Lyne, Bristol, Reading, and Rochester; no death from this disease was, however, recorded in any of the other sanitary districts. Measles showed epidemic prevalence in many of the town districts, among which may be mentioned Altrincham, Bangor, Bolton, Bradford (Lancashire), Cardiff, Gloucester, Hull, Leicester, Nottingham, Plymouth, Rowley Regis, and Swansea. The fatal cases of scarlet fever were proportionally excessive in Barnsley, Barrow-in-Furness, Bradford, (Lancashire), Gorton, Middlesborough, Swansea, and Tredegar. Whooping-cough was generally the most fatal zymotic disease during last month; it showed especial fatality in Aston, Cardiff, Luton, Reading, and Rochester. The deaths referred to fever, principally enteric, again showed a marked excess in Sheffield; they were also pro-

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MARCH 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from												Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence			Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Abingdon	6,033	11	10	..	2	..	1	5	2	..	..	..	..	..	..	..	..	2	3	..	..	..	21.5	19.5	0.0	5.9	W. T. G. Woodforde, M.D.
Accrington	30,000	103	45	16	4	2	2	12	..	4	..	..	..	..	..	3	1	2	2	3	..	..	40.4	17.7	1.6	3.1	J. Ewart.
Acton‡	14,000	67	34	9	7	3	..	7	8	3	..	..	..	..	3	..	..	3	2	..	..	..	49.9	25.3	2.2	6.7	T. Francis.
Altrincham	12,000	42	31	9	14	1	1	6	..	11	..	6	1	..	4	..	..	3	1	2	..	..	41.2	30.4	10.8	7.9	G. H. Atwell.
Ashton-under-Lyne	33,417	107	96	25	21	8	6	26	10	10	1	1	..	..	3	1	4	15	7	..	13	..	37.7	33.8	3.5	5.3	W. H. Hughes.
Aston Manor	52,821	175	80	31	18	2	3	13	13	10	..	..	1	2	6	..	1	21	4	1	..	..	39.0	17.8	2.2	4.7	H. May.
Banbury	13,500	*	11	3	2	1	1	2	2	2	..	..	1	..	..	..	1	2	1	..	..	..	*	9.6	1.7	1.7	R. Grimbly.
Bangor	7,835	*	21	4	10	1	..	3	3	10	..	10	..	..	..	..	..	3	..	1	..	..	*	31.6	15.0	4.5	H. Rees.
Barnsley	30,000	94	50	8	12	*	*	3	3	11	..	1	7	..	..	1	2	11	4	5	9	..	36.9	19.6	4.3	4.3	M. T. Sadler, M.D.Lond.
Barrow-in-Furness	40,000	155	58	16	13	6	6	9	8	10	..	..	8	..	1	1	1	7	4	3	1	..	45.6	17.1	2.9	2.1	J. Settle.
Bath	53,649	148	135	27	13	5	7	36	47	13	8	1	..	1	2	1	..	23	12	..	18	..	32.5	29.6	2.8	5.0	A. B. Brabazon, M.D.
Batley	29,851	74	61	20	12	6	3	11	9	13	..	11	..	1	1	..	..	18	3	..	..	..	29.2	24.1	5.1	7.1	W. Bayldon.
Beccles	5,000	16	7	1	..	1	..	2	3	..	..	..	..	..	..	..	..	1	2	1	..	..	37.6	16.5	0.0	2.4	E. B. Crowfoot, M.B.
Bilston	25,000	*	44	18	12	..	1	5	8	6	..	..	..	..	4	1	1	7	2	3	..	..	*	20.7	2.8	3.3	W. M. Hancox.
Bingley	9,000	31	25	2	9	3	1	6	2	9	..	8	..	..	1	..	..	2	3	..	..	..	40.6	32.7	11.8	2.6	J. W. Craig, M.D.
Birmingham‡	394,738	1449	799	267	135	35	44	195	123	78	..	7	9	2	33	6	21	198	84	38	93	..	38.3	21.1	2.1	5.2	A. Hill, M.D.
Bishop Stortford	7,024	*	11	3	1	..	1	3	3	1	..	..	..	..	..	1	..	3	1	..	1	..	*	18.4	1.7	5.0	W. Ogle, M.D.
Bisley	5,240	8	11	3	4	..	..	3	1	..	..	..	..	..	..	..	..	5	1	..	..	..	18.0	24.7	0.0	11.2	T. Partridge.
Bolton‡	106,500	330	206	52	43	17	9	56	29	22	..	7	8	..	1	1	5	48	25	3	2	..	32.3	20.2	2.2	4.7	E. Serjeant.
Bootle-cum-Linacre	26,500	*	41	12	11	2	4	7	5	3	..	2	..	1	..	..	..	15	..	4	3	..	*	18.2	1.3	6.7	R. J. Sprakeling.
Boston‡	15,000	50	43	9	7	2	5	7	13	3	..	3	..	..	..	..	..	15	7	2	8	..	34.8	29.9	2.1	10.4	W. Clegg.
Bradford (Lanc.)†	15,000	68	42	14	18	2	..	5	3	14	..	5	6	1	..	1	1	7	1	..	..	..	59.1	36.5	12.2	6.1	J. Hudson.
Bradford (Yorks.)‡	197,196	570	384	97	82	22	15	107	61	44	..	7	19	5	7	3	3	76	42	9	33	..	30.1	20.3	2.3	4.0	H. Butterfield.
Brentford	11,557	38	13	4	3	..	..	4	2	1	..	..	..	..	..	..	1	4	1	..	..	..	38.7	13.2	1.0	4.1	J. Williams.
Bridgnorth	6,000	18	5	1	..	..	1	2	1	1	..	..	..	..	..	..	1	2	..	..	..	..	35.3	9.8	2.0	3.9	A. Mathias.
Bridgwater	13,000	48	38	11	7	2	2	7	9	4	..	1	..	..	1	1	1	7	1	2	7	..	43.5	34.4	3.6	6.3	F. J. C. Parsons.
Bridport	8,145	28	18	5	3	..	*	2	7	..	..	..	..	..	..	..	..	6	..	..	1	..	40.5	26.0	0.0	8.7	G. M. Evans.
Brighton‡	107,321	375	174	38	*	*	*	*	48	11	..	..	6	..	4	..	1	*	*	4	27	..	36.5	16.9	1.1	*	R. P. B. Taaffe, M.D.
Bromley (Kent)‡	14,293	56	15	5	1	2	..	6	1	2	..	1	1	..	..	..	..	2	2	1	..	..	40.8	10.9	1.5	1.5	C. O. Baylis, M.D.
Bristol‡	213,536	716	426	116	*	*	*	*	107	52	1	8	17	2	13	2	9	*	*	12	..	..	35.0	20.8	2.5	*	D. Davies.
Bromsgrove	6,967	26	12	3	6	..	..	..	3	4	..	..	..	..	..	..	4	2	..	..	1	..	43.9	20.3	6.8	3.4	C. Carey.
Burnley	56,000	*	77	29	17	2	3	13	13	10	..	2	..	..	5	..	3	22	5	..	1	..	*	16.2	2.1	4.6	T. Dean, M.D.
Burslem	29,159	111	45	10	9	1	4	14	7	6	..	..	1	..	2	2	1	9	3	1	..	..	44.8	18.2	2.4	3.6	J. M. Taylor.
Burton-upon-Trent	33,000	145	53	12	11	5	..	13	12	10	..	..	6	1	2	1	..	7	7	3	2	..	51.7	18.9	3.6	2.5	C. Perks.
Bury†	50,000	143	92	22	23	*	*	*	12	10	..	1	3	..	5	..	1	21	10	1	6	..	37.3	24.0	2.6	5.5	H. Ashworth.
Bury St. Edmunds	15,600	52	20	2	..	1	2	3	12	..	..	..	..	..	..	..	..	3	2	..	5	..	39.2	15.1	0.0	2.3	F. W. Clarke.
Camborne	15,000	*	36	16	3	1	1	5	10	5	..	..	..	..	4	..	1	7	2	1	..	..	*	28.3	3.9	5.5	E. S. Angove.
Cambridge	34,500	87	56	20	2	4	6	12	12	3	..	..	..	..	3	..	..	8	8	2	6	..	29.7	19.1	1.0	2.7	B. Anningson, M.D.
Canterbury†	20,962	54	27	4	4	2	2	7	8	..	..	..	..	..	..	..	..	11	5	1	4	..	33.6	16.8	0.0	6.8	F. Wacher.
Cardiff	82,364	260	148	45	35	8	9	30	21	32	..	12	1	..	12	2	5	24	13	12	13	..	37.2	21.2	4.6	3.4	H. J. Paine, M.D.
Carnarvon	10,407	28	29	9	2	2	3	8	5	1	..	1	..	..	..	..	..	5	3	2	..	..	31.7	32.8	1.1	5.7	H. Rees.
Chelmsford	9,700	35	17	2	3	1	..	3	8	1	..	..	1	..	..	..	..	3	3	..	4	..	42.5	20.6	1.2	3.6	E. H. Carter.
Cheltenham‡	45,000	94	72	17	4	..	5	13	33	3	..	..	..	1	..	..	..	2	10	4	3	..	21.8	16.7	0.7	2.3	T. Wright, M.D.
Chiswick	12,000	53	24	8	4	..	2	5	5	4	..	..	1	..	1	..	2	4	2	1	..	..	52.0	23.6	3.9	3.9	F. C. Dodsworth
Cirencester	7,500	*	20	10	..	..	..	4	6	..	..	..	..	..	..	..	..	6	..	1	..	..	*	31.4	0.0	9.4	F. T. Bond, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MARCH 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Cockermouth	5,550	*	9	2	1	..	..	3	3	2	..	..	..	..	1	..	1	2	..	..	7	*	19.1	4.2	4.2	J. Ward, M.D.
Colchester	28,633	89	53	10	7	3	4	11	18	7	..	6	..	..	..	1	..	10	6	..	14	36.6	21.8	2.9	4.1	E. Waylen.
Congleton	12,000	26	17	4	2	..	1	6	4	..	..	..	..	..	..	..	..	5	2	1	..	28.2	18.5	0.0	5.4	P. M. Davidson.
Consett†	7,757	21	9	3	2	1	..	..	3	2	..	..	2	..	..	..	..	2	..	..	..	28.2	12.1	2.7	2.7	W. M. Renton.
Coseley	23,000	90	64	12	25	2	1	16	8	9	..	2	..	..	2	..	3	13	2	2	..	40.8	29.0	4.1	5.9	J. Eagleton.
Coventry†	41,000	137	83	14	19	6	4	15	25	11	..	..	3	..	..	3	5	14	6	2	9	34.8	21.1	2.8	3.6	M. A. Fenton, M.D.
Cowpen	5,000	16	7	..	2	2	2	..	1	2	..	..	2	..	..	..	..	2	2	..	..	37.6	16.5	4.7	4.7	H. D. Ward, M.D.
Crompton	7,545	22	6	..	..	..	2	2	2	..	..	..	..	..	..	..	..	2	1	1	..	34.3	9.4	0.0	3.1	W. Brooke, M.D.
Croydon	70,000	182	89	23	15	6	1	19	25	16	..	2	3	1	6	1	3	12	6	..	16	30.6	15.0	2.7	2.0	C. W. Philpot, M.D., B.Sc.
Dartford†	9,531	20	18	4	5	..	2	4	3	1	..	1	..	..	..	..	..	2	2	..	..	27.4	24.6	1.4	2.7	E. Moore.
Derby†	80,385	237	104	27	13	5	3	35	21	7	..	1	2	..	..	2	2	18	14	..	16	38.4	16.9	1.1	2.9	W. Iliffe.
Devonport	50,000	104	81	14	17	8	5	15	22	16	..	5	..	..	7	3	1	14	8	2	6	21.7	16.9	3.3	2.9	J. May, jun.
Dorchester	7,500	22	13	6	..	..	..	2	5	..	..	..	..	..	..	..	..	4	1	1	1	34.5	20.4	0.0	6.3	E. J. Day.
Dover	33,636	93	36	6	7	1	1	7	14	4	..	..	1	..	3	..	..	7	3	..	5	32.6	12.6	1.4	2.5	M. K. Robinson, M.D.
Droitwich	3,600	12	10	2	1	..	..	2	5	..	..	..	..	..	..	..	..	3	1	..	2	39.2	32.7	0.0	9.8	H. Swete, M.D.
Eastbourne	18,000	*	27	6	3	1	3	8	6	1	..	..	..	..	..	..	1	6	5	1	2	*	17.7	0.7	3.9	E. F. Fussell, M.B.
East Dereham	5,791	17	9	2	..	..	1	1	5	..	..	..	..	..	..	..	..	..	1	..	..	34.6	18.3	0.0	0.0	H. B. Vincent.
Fenton	14,000	57	27	6	7	..	2	7	5	3	..	..	2	..	1	..	..	5	..	..	..	47.9	22.7	2.5	4.2	A. V. Griffiths.
Finchley	11,339	25	11	1	2	2	1	2	3	1	..	..	..	1	..	..	1	2	1	1	1	26.0	11.4	1.0	2.1	J. Turle, M.D.
Glossop	18,697	62	24	5	4	..	2	8	5	2	..	..	..	..	..	1	1	6	4	..	..	39.0	15.1	1.3	3.8	J. Rhodes.
Gloucester	37,907	112	63	18	11	3	9	7	15	14	..	8	..	..	3	1	2	6	6	1	7	34.8	19.6	4.3	1.9	J. P. Wilton.
Goole	10,205	43	18	6	1	1	1	4	5	1	..	1	..	..	..	..	..	4	2	..	2	49.6	20.8	1.2	4.6	J. Mitchell Wilson, M.B.
Gorton†	32,000	86	62	14	12	14	5	14	3	21	..	..	19	..	2	..	..	7	6	..	..	35.0	25.3	8.6	2.9	R. E. Hammond.
Great Driffield	6,033	13	8	..	5	..	..	1	2	2	..	2	..	..	..	..	..	3	..	1	..	25.4	15.6	3.9	5.9	D. Ridpath, M.D.
Guildford	10,167	31	12	2	1	..	..	6	3	1	..	..	..	1	..	..	..	4	1	..	..	35.9	13.9	1.2	4.6	J. Morton, M.D.
Halifax†	72,000	204	145	31	22	*	*	*	66	10	..	..	6	1	2	..	1	34	11	2	13	36.9	26.3	1.8	6.2	D. Ainley.
Harborne	5,500	14	11	2	..	1	..	2	6	..	..	..	..	..	..	..	..	2	..	1	3	30.0	23.6	0.0	4.3	R. W. Smith, M.D.
Heywood	23,000	*	24	7	4	1	2	5	5	1	..	1	..	..	..	..	..	3	2	..	..	*	12.3	0.5	1.5	H. Wisken.
Hinckley	7,500	25	17	8	1	1	3	2	2	2	..	..	..	..	1	1	..	1	3	..	..	39.2	26.7	3.1	1.6	W. H. Griffiths.
Hindley	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. G. Brayton.
Horwich	4,315	9	9	2	1	1	..	3	2	2	..	..	1	..	..	1	..	2	..	1	..	24.6	24.6	5.5	5.5	G. H. Whitaker.
Huddersfield	81,780	225	164	30	29	12	14	48	31	10	..	1	5	..	1	..	3	39	22	7	11	28.7	20.9	1.3	5.0	J. S. Cameron, M.D., B.Sc.
Hull†	149,627	540	320	98	*	*	*	*	56	64	..	48	5	..	5	1	5	*	*	6	24	37.7	22.3	4.5	*	J. F. Holden.
Hyde	28,149	89	55	21	7	3	3	11	10	3	..	..	2	..	..	..	1	12	3	..	..	37.2	23.0	1.3	5.0	J. Nield Cooper.
Ilfracombe	5,500	14	6	1	..	1	..	1	3	..	..	..	..	..	..	..	..	..	..	..	..	30.0	12.8	0.0	0.0	E. J. Slade-King, M.D.
Ilkeston†	12,356	38	29	10	10	..	1	*	4	7	..	5	..	..	..	..	2	5	2	..	..	40.1	30.6	7.4	5.3	R. Wood.
Ipswich	47,414	120	76	18	12	*	*	*	19	3	..	..	1	2	..	..	..	15	11	2	4	29.8	18.9	0.7	3.7	G. S. Elliston.
Jarrow	22,500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Spear.
Keighley	24,000	56	..	18	14	3	6	21	14	7	..	1	4	..	..	..	2	18	9	..	5	27.5	37.3	3.4	8.8	A. Roberts.
Leamington	24,500	51	40	6	5	1	1	7	20	..	..	..	..	..	..	..	..	5	6	1	3	24.8	19.5	0.0	2.4	J. S. Baly.
Leeds†	318,989	896	503	116	103	*	*	*	184	39	..	6	14	1	5	4	9	109	47	29	..	36.6	20.6	1.6	4.5	G. Goldie.
Leek	12,527	42	32	7	4	..	2	9	10	1	..	..	1	..	..	..	..	11	4	..	2	39.5	30.1	0.9	10.3	J. J. Ritchie.
Leicester‡	129,912	499	262	70	*	*	*	*	50	37	..	19	6	3	4	2	3	*	*	3	38	40.1	21.0	3.0	*	W. Johnston, M.D.
Leigh	20,400	82	44	11	11	8	1	9	10	7	..	..	3	..	1	3	..	9	5	..	..	47.3	25.4	4.0	5.2	J. Hall.
Lichfield	8,129	20	11	5	*	..	..	*	*	1	..	..	..	..	..	1	..	1	1	..	..	29.3	16.1	1.5	1.5	G. A. Carter, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MARCH 1880—(*Continued.*)

Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
LINCOLN‡	32,103	128	72	22	10	4	1	17	18	5	..	..	1	..	..	1	3	17	5	1	13	41.6	23.4	1.6	5.5	C. Harrison, M.D.
LITTLEHAMPTON	4,000	9	10	5	2	1	..	1	1	3	..	2	..	..	..	..	1	2	1	..	..	26.5	29.4	8.8	5.9	C. Kelly, M.D.
LIVERPOOL‡	544,056	1998	1268	306	270	58	67	371	196	140	..	25	29	5	40	22	19	300	143	66	173	38.3	24.3	2.7	5.8	J. S. Taylor, M.D.
LIVERSEDGE	13,750	25	25	8	4	3	..	8	2	4	..	2	..	..	..	1	1	4	2	..	..	21.4	21.4	3.4	3.4	W. J. Sykes, M.D.
LUTON	24,200	91	44	15	10	1	1	10	7	10	..	3	..	..	7	..	..	3	2	1	..	44.3	21.4	4.9	1.5	H. Sworder.
LYTHAM	5,000	8	4	..	1	..	..	1	2	..	..	..	..	..	..	..	..	1	..	..	1	18.8	9.4	0.0	2.4	W. E. Pountney, M.B.
MACCLESFIELD	36,641	103	73	11	7	2	5	29	19	1	..	..	..	..	..	..	1	10	12	..	16	33.1	23.5	0.3	3.2	G. Bland.
MAIDENHEAD	8,281	21	12	2	..	..	1	5	4	1	..	..	..	1	..	..	..	..	4	..	1	29.9	17.1	1.4	0.0	W. T. G. Woodforde, M.D.
MAIDSTONE‡	29,537	113	54	12	15	3	*	*	11	4	..	2	..	..	..	1	1	11	4	1	1	39.9	19.1	1.4	3.9	M. A. Adams.
MANCHESTER‡	363,130	1267	922	193	*	*	*	*	155	110	..	18	30	4	45	5	8	*	*	31	171	36.4	26.5	3.2	*	J. Leigh.
MERTHYR TYDFIL	52,000	143	89	15	13	1	8	25	27	6	..	2	..	2	1	1	..	18	12	7	4	31.1	19.4	1.3	3.9	T. J. Dyke.
MIDDLESBROUGH	53,580	140	77	22	19	4	5	15	12	10	..	..	6	..	2	1	1	17	6	3	2	30.8	16.9	2.2	3.7	J. A. Malcomson, M.D.
MIDDLETON and TONGE	16,700	33	37	14	5	..	3	7	8	4	..	1	..	..	3	..	..	2	5	..	..	25.8	28.9	3.1	1.6	T. B. Knott.
MORLEY	12,100	58	27	9	3	2	..	7	6	1	..	..	..	..	1	..	..	7	4	1	..	56.4	26.3	1.0	6.8	S. T. Steele.
NEATH	12,000	45	33	6	1	3	1	11	11	..	..	..	..	..	..	..	..	5	5	..	5	44.2	32.4	0.0	4.9	G. Ryding, M.D.
NEWARK‡	13,746	59	25	6	3	2	2	6	6	2	..	1	..	..	..	1	..	7	2	..	4	44.8	19.0	1.5	5.3	A. Ashby, M.B.
NEWBURY	9,796	30	26	8	4	..	..	3	11	2	..	..	..	..	..	1	..	8	..	..	..	36.1	31.3	2.4	9.6	W. T. G. Woodforde, M.D.
NEWCASTLE-UNDER-LYME	18,000	48	30	13	4	2	1	2	3	5	..	..	..	..	3	2	..	5	2	..	..	31.4	19.6	3.3	3.3	St. J. Edwards, M.D.
NEWCASTLE-UPON-TYNE‡	149,366	540	310	89	62	*	*	*	56	40	..	..	15	..	17	4	4	50	25	12	33	37.7	21.6	2.8	3.5	H. E. Armstrong.
NORWICH‡	85,827	283	194	43	*	*	*	*	60	28	..	1	13	..	12	2	..	*	*	6	18	34.4	23.6	3.4	*	T. W. Crosse.
NOTTINGHAM	173,627	395	409	106	119	24	14	75	71	86	..	65	17	..	2	..	2	82	37	12	26	30.7	27.7	5.8	5.5	E. Seaton, M.D.
NUNEATON	7,400	32	15	3	..	..	1	5	6	..	..	..	..	..	..	..	..	5	..	1	..	51.0	23.9	0.0	8.0	E. Peacock.
OAKWORTH	6,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F. W. Barry, M.D.
OLDHAM†	115,413	299	227	50	56	21	13	51	36	48	..	16	16	1	8	2	5	58	16	8	16	33.8	25.6	5.4	6.6	J. M. Sutton, M.D.
OXFORD†	37,500	106	57	17	9	6	1	12	12	4	..	2	1	1	..	..	..	12	3	4	7	36.8	19.8	1.4	4.2	A. Winkfield.
PEMBROKE	15,000	*	20	3	3	2	1	5	6	..	..	..	..	..	..	..	..	5	1	1	..	*	15.7	0.0	3.9	D. P. Saer.
PENZANCE	12,000	37	24	6	4	..	2	4	8	2	..	..	..	1	..	1	..	5	1	..	..	36.3	23.6	2.0	4.9	G. B. Millett.
PETERBOROUGH‡	22,000	65	38	14	1	4	2	11	6	1	..	..	..	..	..	1	..	12	3	2	1	30.8	18.0	0.5	5.7	W. Thomson, M.D.
PLYMOUTH‡	74,993	221	225	47	85	12	9	31	41	79	..	64	..	2	11	2	..	37	18	2	11	30.7	31.3	11.0	5.1	H. Greenway.
POOLE	11,530	24	19	3	4	..	..	6	6	..	..	..	..	..	..	..	..	6	2	1	1	24.5	19.4	0.0	6.1	H. A. Lawton.
PORTSMOUTH	134,224	413	203	42	43	7	13	52	46	12	..	3	1	..	4	3	1	42	18	1	20	32.1	17.8	1.1	3.7	G. Turner.
PRESTON†	88,000	261	153	42	33	3	8	39	28	11	..	..	5	1	2	..	3	29	13	3	6	38.7	22.7	1.6	4.3	H. O. Pilkington.
RAMSGATE‡	22,200	65	41	5	9	..	1	10	16	2	..	1	1	..	..	..	..	12	3	..	..	30.5	19.3	0.9	5.6	J. W. Barry.
READING†	41,500	115	74	27	11	3	2	13	18	9	1	..	1	1	5	..	1	12	7	1	10	36.1	23.2	2.8	3.8	J. Shea, M.D.
REDDITCH	10,070	43	5	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	50.3	5.8	0.0	0.0	H. M. Page, S.Sc.C.Camb.
REDRUTH	9,500	32	18	8	3	1	2	1	3	6	..	..	1	..	5	..	..	4	1	2	1	39.7	22.3	7.4	5.0	J. S. Hichens.
REIGATE	18,000	39	24	4	3	1	2	6	8	1	..	..	..	..	1	..	..	8	..	..	..	25.5	15.7	0.7	5.2	E. L. Jacob.
RICHMOND (Surrey)	19,500	59	27	3	3	4	1	11	5	4	..	..	..	..	..	1	..	2	3	..	2	31.6	16.3	2.4	1.2	J. T. Rowland, M.D.
ROCHDALE	72,000	209	137	37	30	9	3	39	19	19	..	7	2	1	6	1	2	21	15	2	..	34.2	22.4	3.1	3.4	J. Henry, M.D.
ROCHESTER	18,500	56	47	7	17	2	4	7	10	18	1	2	3	..	12	..	..	10	4	..	7	35.6	29.9	11.5	6.4	J. Sladen-Knight, M.D.
ROMSEY	4,481	16	3	1	..	..	..	1	1	..	..	..	..	..	..	..	..	1	..	..	..	41.8	7.9	0.0	2.6	F. Buckell.
ROTHERHAM‡	34,404	131	75	21	6	3	5	23	17	7	..	..	2	..	..	4	1	*	*	..	..	39.7	22.7	2.1	*	J. Hardwicke, M.D.
ROWLEY REGIS	27,000	102	42	13	15	3	1	6	4	14	..	11	2	..	..	1	..	10	4	2	..	44.5	18.3	6.1	4.4	J. G. Beasley.
RUGBY	8,916	28	17	3	2	1	..	6	5	..	..	..	..	..	..	..	..	8	2	1	4	37.0	22.5	0.0	10.6	G. Wilson, M.D.
RUNCORN	14,000	65	21	5	5	1	3	5	2	4	..	..	..	3	..	1	..	5	4	..	..	54.7	17.7	3.4	4.2	R. H. Mouritz.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MARCH 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from										Deaths in Public Institutions	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Rusholme†	12,500	28	18	3	2	..	2	6	5	2	..	..	2	..	..	..	..	4	2	1	..	29.2	18.8	1.1	4.2	J. Gregory.
Ryde	12,800	*	17	3	..	2	1	6	5	1	..	..	..	..	..	1	..	6	..	..	..	*	15.6	0.9	5.5	A. Platt Wilks, M.B.
Salford†	185,786	703	418	104	109	26	14	106	59	80	..	7	21	1	44	3	4	100	58	7	56	39.5	23.5	4.5	5.6	J. Tatham, M.D., S.Sc. C.Camb.
Selby	6,193	19	7	4	..	..	..	2	1	..	..	..	..	..	..	..	..	1	..	..	1	36.1	13.3	0.0	1.9	J. Mitchell Wilson, M.B.
Sheffield†	304,938	843	489	130	122	*	*	*	71	91	..	14	33	2	18	22	2	115	33	12	46	36.0	20.9	3.9	4.9	T. W. Hime, M.B.
Sittingbourne†	9,000	19	16	3	3	2	2	3	3	2	..	..	..	..	..	2	..	1	1	..	..	27.5	23.2	2.9	1.4	H. G. Sutton.
Skipton	9,500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	..	F. W. Barry, M. D.
Smethwick	21,000	84	32	10	4	2	1	7	8	2	..	..	1	..	1	..	..	5	2	..	..	47.1	17.9	1.1	2.8	W. Sutton.
Southport§	34,100	90	61	24	11	..	1	17	8	5	..	..	2	..	3	..	..	8	5	..	..	31.1	21.1	1.7	2.8	H. H. Vernon, M.D.
South Shields	62,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	..	..	..	..	..	..	..	J. Spear.
Stalybridge	23,405	69	47	8	15	..	1	11	12	2	..	..	..	..	1	..	1	21	1	..	..	34.7	23.6	1.0	10.6	F. J. Roberts-Dudley.
Stourbridge	9,376	37	12	1	3	4	1	1	3	2	..	..	1	..	..	1	..	..	..	..	..	46.5	15.1	2.5	..	R. S. T. Eagar, M.D.
Stratford-on-Avon	7,899	*	13	1	..	..	5	4	3	..	..	..	..	..	..	..	..	2	2	1	2	*	19.4	0.0	3.0	G. H. Fosbroke, S. Sc. C. Camb.
Stroud	7,665	30	15	3	..	..	2	6	4	1	..	..	..	..	..	1	..	3	1	1	2	46.1	23.0	1.5	4.6	T. Partridge.
Sunderland†	116,730	345	196	38	47	22	11	39	39	35	..	7	21	..	4	3	..	30	18	5	20	38.6	21.9	3.9	3.3	H. J. Yeld, M.D.
Swansea	65,890	238	146	36	34	11	13	31	21	31	..	11	18	..	..	2	..	27	10	6	9	42.5	26.1	5.5	4.8	E. Davies.
Swinton	7,753	28	16	*	*	*	*	*	*	4	..	3	..	..	..	1	..	5	..	2	..	47.1	26.9	6.7	8.4	C. S. Blythman, M.B.
Tamworth	4,846	19	7	1	1	..	..	4	1	2	..	..	2	..	..	..	..	..	1	2	..	46.1	17.0	4.9	0.0	H. J. Fausset, M.D.
Taunton	16,227	41	34	9	3	1	3	6	12	1	..	..	..	..	..	..	1	6	2	..	7	29.8	24.7	0.7	4.4	H. J. Alford, M.D.
Teignmouth	7,000	19	14	2	3	1	1	4	3	2	..	..	..	..	2	..	..	4	2	1	..	31.9	23.5	3.4	6.7	W. C. Lake, M.D.
Tewkesbury	5,500	22	11	1	2	..	..	6	2	3	..	..	..	..	2	..	1	..	1	1	1	47.1	23.6	6.4	0.0	W. Allard.
Tiverton	10,400	12	15	..	1	2	2	2	8	..	..	..	..	..	..	..	..	2	..	..	2	13.6	17.0	0.0	2.3	J. P. McNeill, M.D.
Torquay†	26,000	*	48	15	6	..	4	15	8	6	..	..	1	..	2	3	..	10	5	..	..	*	24.1	3.0	5.0	P. Q. Karkeek.
Tottenham†	37,000	129	49	15	5	1	..	10	18	2	..	..	..	..	..	2	..	6	..	4	1	45.5	17.3	0.7	2.1	C. T. Conolly.
Toxteth Park	8,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	R. W. Pendleton.
Tredegar	18,000	53	55	9	9	5	8	12	12	6	..	..	5	..	1	..	..	11	4	12	3	34.7	36.0	3.9	7.2	G. A. Brown.
Trowbridge†	12,000	27	16	8	2	..	..	1	5	..	..	..	..	..	..	..	..	7	..	..	..	29.3	17.4	0.0	7.6	G. C. Tayler, M.D.
Truro	11,000	19	23	10	1	..	1	2	9	1	..	..	..	..	1	..	..	4	..	1	1	20.3	24.6	1.1	4.3	E. Sharp.
Tunstall	15,300	*	18	4	3	1	1	3	6	1	..	..	..	..	..	1	2	7	3	..	..	*	15.3	0.9	6.0	J. P. Edwards.
Ulverston	11,000	33	12	5	2	..	..	3	2	..	..	..	..	..	..	..	..	1	2	..	..	35.3	12.8	0.0	1.1	A. Thompson, M.D.
Walker-on-Tyne	8,000	36	11	3	2	..	..	4	2	2	..	..	..	..	2	..	..	1	..	..	..	53.0	16.2	2.9	1.5	H. F. Hurst.
Wallasey†	20,000	69	29	5	7	1	2	10	4	1	..	..	1	..	..	..	..	6	1	3	..	45.0	18.9	0.7	3.9	I. Byerley.
Warrington‡	38,000	155	57	20	6	3	5	12	11	5	..	..	2	..	2	..	1	10	5	..	7	42.5	15.6	1.4	2.7	G. W. Joseph.
Wednesbury†	26,000	68	38	17	9	1	..	5	6	8	..	..	..	1	4	..	3	4	1	1	..	34.1	19.0	4.0	2.0	J. C. Garman.
West Bromwich‡	54,000	239	109	30	23	*	*	*	21	9	..	2	3	..	1	1	2	*	*	*	*	46.2	21.1	1.7	*	J. Manley.
West Derby	33,693	103	41	11	10	5	..	5	10	3	..	..	3	..	..	..	..	12	3	1	..	36.0	14.3	1.0	4.2	W. Carter, M.B.
Weymouth	15,269	36	28	10	4	1	3	4	6	1	..	..	..	..	..	1	..	11	2	1	3	27.8	21.0	0.8	8.5	H. Tizard, M.D.
Widnes	22,000	110	27	5	7	2	2	7	4	4	..	..	3	..	..	1	..	5	2	2	..	58.9	14.5	2.1	2.7	W. Cooper.
Willenhall‡	19,300	52	18	6	4	2	1	3	2	4	..	..	1	..	2	..	1	4	..	1	..	28.1	9.7	2.2	2.2	W. H. Hartill.
Withington†	15,000	23	13	4	3	1	1	3	..	1	..	..	1	..	..	..	..	1	..	..	..	20.0	11.3	0.9	0.9	T. C. Railton, M.B.
Wolverhampton†	76,000	222	112	32	17	10	6	30	17	12	..	..	3	..	3	..	6	38	4	2	13	38.1	19.2	2.1	6.5	J. H. Love.
Workington	10,000	45	22	4	6	1	1	6	4	3	..	2	1	..	..	..	..	3	4	..	..	53.0	25.9	3.5	3.5	J. Ward, M.D.
Worthing	9,540	27	13	3	2	2	..	3	3	1	..	..	..	..	1	..	..	2	..	..	2	33.3	16.0	1.2	2.5	C. Kelly, M.D.
York	46,850	109	79	10	8	8	4	28	21	4	..	..	3	..	..	..	1	12	11	4	7	30.3	19.9	1.0	3.0	S. W. North.
Ystradyfodwg	52,000	205	102	42	16	6	8	18	12	11	..	1	3	..	1	6	..	16	11	3	..	46.4	23.1	2.5	3.6	W. Rhys.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 19.6.

portionally excessive in Accrington, Coventry, Leigh, Rotherham, Torquay, and Ystradyfodwg.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 4.6 per 1,000 persons living in the 174 sanitary districts, against 7.4, 5.1, and 6.1 in the three preceding months. Excessive death-rates from these diseases were, however, recorded in many of the smaller towns; they were above 8 per 1,000 in Nuneaton, Keighley, Bridport, Cirencester, Droitwich, Newbury, Leek, Boston, Rugby, and Stalybridge. The wide variations between the death-rates from lung diseases in the several town districts fully deserve more attention at the hands of medical officers of health than they have yet received.

Infant mortality, measured by the proportion of deaths under one year to births registered, averaged 1.60 per 1,000 in the 174 Urban Sanitary districts; in the twenty large towns the death-rate of infants averaged 148 per 1,000, against 161 and 166 in the two preceding months. In London the infant death-rate, which had been equal to 178 per 1,000 during February, declined to 142 last month. In many of the smaller Urban Sanitary districts infant mortality showed a marked excess in March, the rate exceeded 200 per 1,000 in Altrincham, Ashton-under-Lyne, Bradford (Lancashire), Bridgwater, Cambridge, Hyde, Ilkeston, Keighley, Liversedge, Newbury, Newcastle-under-Lyme, Nottingham, Peterborough, Plymouth, Reading, Redruth, Wednesbury, and Ystradyfodwg.

The table of mortality statistics for March includes the fourteen watering-places or health-resorts:—Bangor, Brighton, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weymouth, and Worthing. It is eminently satisfactory to be able to report that the average annual death-rate in these watering-places during March did not exceed 18.6, while the zymotic death-rate was but 1.8 per 1,000 of the estimated population. These rates showed a further decline from the low rates that prevailed in the previous month. Exclusive of Brighton, for which we are unable to give the information, the death-rate from diseases of the respiratory organs during March averaged 4.3 per 1,000 in these watering-places. We regret that we have, hitherto, failed to secure the co-operation of the medical officers of health of a larger number of the principal watering-places, for the purposes of our monthly table. We doubt not that the best interests of all health resorts will be served by affording to the public trustworthy means of refuting false reports of epidemic prevalence of zymotic disease, too often spread during the holiday season from similar motives.

SPECIAL REPORTS.

THE STATISTICAL SOCIETY.

At the usual monthly meeting held on the 17th ult., a paper was read by Mr. Thomas A. Welton, 'On Certain Changes in the English Rates of Mortality.'

Mr. Welton referred to the manner in which permanent but gradual changes affecting mortality may be obscured by those variations which arise from transient causes of disturbance, and which for the moment are more considerable, and showed that since 1846-50 there has been a reduction in the English rates of mortality of both sexes between the ages 5–25. That the rates of mortality amongst males at ages 35—75, after being somewhat diminished, have become higher than they were, to the extent of 15 or 20 per cent. above the minimum. But that amongst females, the tendency towards increased mortality at those ages is barely observable. Proceeding to test the matter by constructing corrected tables of mortality, according to the experience of England and Wales in each quinquennial period since 1841-45, it appears that there has apparently been an increase of male mortality at the higher ages, sufficient to counterbalance the improvement in early life, and even after a time to turn it into a loss; whilst among females, a more than proportionate improvement in early life has been followed by a condition of things at the higher ages which leaves the gain practically undiminished. This has brought about a great change in the relative mortality of the sexes, insomuch that whilst in 1856-60 the average ages at which the numbers born were reduced to one half, were—males, 46.5 years; females, 48.9 years; difference 2.4 in favour of females; according to the experience of 1871-75, the figures would be—males, 45.8 years; females, 50.9 years; difference 5.1 in favour of females. Showing that whereas, according to the English life table, a certain number of males and females respectively would survive out of a fixed number of births, to be counted at a census as being aged 75—80, viz.: 288,993 males, and 333,526 females, the experience of 1871-75 points to the survival of no more than 264,475 males, but an increased number of females, viz., 356,199. The tendency towards an increasing excess of surviving females at high ages, as compared with the number of males attaining such ages, seems to have steadily gained strength throughout the thirty years ending with 1875. Turning to the causes of this state of things, Mr. Welton showed that there has been a steady increase during the whole of the period in male mortality after thirty-five years of age by diseases of the lungs, heart, and brain, and also the less important diseases of the kidneys, and cancer. Such increased mortality has been so general, even in the rural divisions of the kingdom, that it seems difficult to attribute it to the increased strain upon the vital energies occasioned by modern conditions of life; but he did not attempt to assign a cause for the changes which have taken place, nor for the fact that the mortality from consumption (phthisis) has remained almost stationary, whilst lung disease has become so much more fatal.

THE UTILISATION OF REFUSE.

THE Corporation of Manchester have established Sanitary Works on the banks of the Medlock, at Holt Town, a distance of about a mile and a half from the city. What is known as the pail system is almost universally adopted in Manchester, out of 60,000 closets there being only 300 on the old midden plan, and it is expected that these will also be converted into pail-closets before long. The contents of the closets amount in twelve months to about 190,000 tons. The works cover an area of six acres, and were recently constructed at a cost of £100,000 for the Health Committee. The pails are collected and conveyed to the premises in vehicles specially built for the purpose. The contents are poured into a screened hopper, from which they fall into a machine where they are sifted, the solid substance being separated from the liquid. The latter is conveyed into tanks, where it is mixed with the blood and flesh of

dead horses, dogs, cats, fish, a small proportion of bones, slaughter-house garbage, etc., all ground by a specially constructed mill into a pulpy mass. There is also added a quantity of acid for the purpose of fixing the ammonia. These are all the ingredients used in the process. The liquid is next dealt with in the concentrating machinery, the watery portions being driven off, condensed, and utilised in the boilers. The solid material left in the concentrator is removed at frequent intervals, and taken direct to the disintegrators and sacking-machine, where it is reduced to a fine granular form, and packed in bags ready for despatch to farmers. For the purpose of securing uniformity of quality, as far as possible, an analysis of the manure is made daily, and the following is stated to be the mean result:—Organic matter and salts of ammonia (containing nitrogen 2.97 degs., equal to ammonia 3.61 degs.), 27.74; sulphate of lime, 8.09; phosphoric acid (equal to trebasic phosphate of lime, 5.01), 2.43; alkaline salts, 2.32; oxide of iron, 13.17; alumina, 6.54; insoluble silicious matter, 18.78; moisture, 20.93. The quantity of this manure recommended for every statute acre of grass, clover, cereals, or root crops, is about ten tons, but less may be used on good soils. It is stated that with this dressing the crops will not be forced, and the fertilising properties of the manure will not be exhausted during the first year. It is delivered at any railway or canal station in Great Britain in quantities of not less than two tons at £3 a ton. About 350 tons of liquid is the daily supply, and this is reduced to 37 tons of concentrated manure and 110 tons of calcined material. The ashes and other contents of the ashpits are not used in the manufacture of the manure. The ash, on being discharged from the vans, is run down a shoot into a machine which screens it, the dust being separated and carried away. The coarser stuff falls through another shoot to the ground-floor fronting the boilers, where it is used for fuel. The solid refuse from the pails is also consigned to the furnaces, so that for ten boilers only a few tons of coal a day are used. The calcined fuel is ground with lime into mortar and sold to builders. The dust from the ashes is the only substance that is not utilised, and the Corporation have to pay from 1s. 4d. to 1s. 6d. a ton to get rid of it. The premises include workshops, farriery, workmen's dining-hall, laboratory, sack and sample rooms, offices, engine-houses, etc. These works take only half the refuse of Manchester, and it is proposed to erect a similar manufactory to meet the requirements of the other half.

TRICHINOSIS ON BOARD THE 'CORNWALL'.

A REPORT of the greatest medical and general interest has just been published by the Local Government Board on the results of the investigation made by their inspector, Mr. Power, into the circumstances of an outbreak of 'fever', that proved to be trichinosis, on board the reformatory school-ship *Cornwall*. The report raises medical questions of the most profound pathological importance, which are eminently deserving of further study and investigation. Into these tempting questions, however, we cannot enter; but must confine ourselves to the medico-sanitary aspects of the outbreak. It appears, from Mr. Power's report, that at mid-September last, the health of the 262 boys on board the ship had, during a long period, been satisfactory. But on Tuesday, 23rd September, seven boys reported themselves to the medical officer of the ship for the sick list. Setting aside one trivial case, six boys suffered thenceforward from an illness that lasted 18 days in a fatal case, and 26, 37, 38, 42, and 88 days in cases that recovered. Next day, 24th September, two boys reported themselves to the doctor; one of them was only slightly ill for a few days, the other was confined to bed 28 days. By the 29th of September 10 other boys had come on the sick list. None of these but one had marked objective symptoms, and all of them seemed well in a few days. On Tuesday, 30th September, and Wednesday, 1st October, six boys came under treatment. Three of them had illness lasting 18, 18, and 29 days; the ailments of the others appeared trivial. Between 3rd and 6th October nine boys, and on 11th October one boy came under the doctor. All, except one, who suffered several weeks from jaundice, were out of sorts a few days only. From Tuesday, 14th, to Thursday, 17th October, six boys came under treatment. Five of them were ill for 18, 18, 31, 35, and 67 days respectively; one proved only a trivial case. On Tuesday, 21st October, one boy, and on 23rd October another boy came under treatment. The former was ill 14 days, the latter had no decided symptoms. In all, therefore, there were forty-three cases of some sort or degree of sickness. Eighteen boys suffered from decided, most of them from serious illness, and one of them died on the eighteenth day of his disease. Twenty-five other boys were slightly ill, most of them for a few days only; and some of these twenty-five may not, it was thought, have been ill at all, but, owing to panic, may have imagined themselves ill. All the serious cases, and some of the slighter ones, had a disease which was properly described as a 'continued fever'. In most instances, the symptoms were clearly indicative of enteric disturbance, and in some cases there were, in addition, persistent diarrhœa, rose-coloured spots on the abdomen, and hæmorrhage to a greater or less extent from the bowels. From these data, the outbreak was regarded as one of enteric fever.

Setting himself to inquire into possible causes for an outbreak of enteric fever on board, Mr. Power was able to exclude in succession all known causes of that disease. It was not until these lines of inquiry had been exhausted that certain circumstances as to the food of the boys, which had been present in Mr. Power's mind throughout the investigation, began to attain prominence. These were the fact that the food supplied to and cooked for the boys was distinct and separate from that of the officers, who escaped illness, that the incidence of the first outburst of the disease had been exceptionally on a particular mess, and that the more serious cases arranged themselves in groups, which were attacked mainly on Tuesdays or Wednesdays, at weekly or fortnightly intervals. The food eaten at neither breakfast nor supper offered a hint as to the cause of the outbreak, as neither meal varied in any way suggestive of relation with the observed grouping of the cases. As to dinner, it was found that the animal food of the boys, though varied day by day, was of the same kind on every day but Monday, when it was alternately salt beef and salt pork. Mr. Power's suspicions was therefore excited against the salt pork, and it occurred to him that if pork had had to do with the outbreak, some of it *might have been trichinised; and that the disease, therefore, from which the boys suffered, might not have been enteric fever at all, but trichinosis.* A theory of trichinosis seemed exactly to fit the conditions assumed as re-

quiring fulfilment. A newly broached cask of pork came into use shortly before the occurrence of the outbreak. The pork was consumed by the boys alone. Portions of the pork, not thoroughly well cooked, might form but a small proportion of a total dinner for the boys; and might, therefore, have been consumed on particular days within the limits of one or two messes, and thus (if such portions happened to be infected with trichina) the incidence of the severer cases on a particular mess or messes might have been brought about. Again, pork might have been consumed on two successive Mondays, and after that not until a fourth Monday, and thus the specialities of the time-distribution of cases, notably a peculiar grouping of the graver attacks, might be accounted for, while the great diversity of duration of illness would be quite intelligible. Other evidence seemed to support this theory. It was ascertained that the use of pork on board had, owing to misgiving as to the wholesomeness of such food, been discontinued shortly before the cessation of the out break; that the pork in question was 'American pork', exceptionally obtained, and that it consisted solely of 'belly pieces', and, therefore, of parts of many pigs, and of those parts most likely to be infested with trichina. The theory of trichinosis was accordingly put to the test of further inquiry, but no confirmation of it was at first found. Further inquiry, however, of the boys, as to the nature of their ailments, led to the conclusion that the outbreak, characterised as it was in the bulk of the cases by simple continued fever with gastro-enteric disturbance, might just as well have been related to trichinosis as to enteric fever; the fact of certain of the graver cases of the outbreak, taken collectively, presenting most of the symptoms characteristic of enteric fever, seeming to lose significance, besides the circumstance that these very same cases presented, collectively, many symptoms that might be referable to trichinosis. Under these circumstances, the need for direct evidence respecting the nature of the outbreak had become imperative. Accordingly, permission was sought and obtained from the Home Office, for the exhumation and pathological examination of the only fatal case of the outbreak. This, which was in effect a test-case, was that of a boy who was one of the first group of sufferers attacked on September 23rd. He in particular exhibited symptoms (persistent diarrhœa, copious eruption of rose spots, and even free hæmorrhage from the bowels), believed at the time to be those of enteric fever. In addition, he, in dying on the eighteenth day of his illness, appeared to be the subject of bowel-perforation.

The *post-mortem* examination showed, beyond a doubt, that whatever might have been the nature of the boys' illness, it certainly was not, as supposed, enteric fever. Very careful examination of the stomach and intestines failed to find any trace of ulceration, and the bowels proved throughout intact; indeed, no such anatomical changes as are characteristic of enteric fever toward the end of the third week were to be found. But, in the very first specimen examined microscopically (a few fibres from one of the abdominal muscles), was found *a wandering and living trichina;* and further search revealed the presence of these parasites in most of the muscles examined. Although tolerably abundant, the trichinæ could not be said to 'infest' (in the common sense of the word) any of the muscles, except perhaps the diaphragm, and in none of them had the parasite reached the stage of incapsulation. Except the first found, no trichinæ exhibited active movement, and comparatively few had obtained, as had that one, their full growth as muscular parasites. Doubt could, therefore, no longer exist that this boy had died from acute trichinosis. Not only was the presence in his body of the actual parasite demonstrated, but the results of microscopic examination were precisely such as might have been anticipated in a case of early death from trichina disease. Death took place in this instance on the eighteenth day after appearance of symptoms, at a period that is too short to have allowed universal migration of brood-trichinæ, and insufficient also for the attainment of full growth in the muscles of any but early migrants. At the same time, the period was not nearly long enough to suffice for the full evolution and encapsulation of many (if, indeed, of any) muscular parasites.

Demonstration such as this of the nature of the fatal illness in a test-case was regarded by Mr. Power as in effect demonstration of the nature of the outbreak itself. The evidence adduced indicated that the cause, whatever that might have been, which produced this boy's illness, produced also the illness (so far as that was specific) of his shipmates; that his case, forming one of the first and most severe, occurring on September 23rd, was representative of the earliest and intensest operation of that cause; and that it was representative also, and in a high degree, not of the anomalous but of the enteric class of cases; of those, namely, whereon the diagnosis of the outbreak had been in the first instance based, and in regard of which a theory of trichinosis had appeared at one time untenable.

The question arises as to the circumstances under which trichina disease became conveyed to the boys. As to this, Mr. Power is unfortunately unable to state anything definite, but he makes the following suggestion, which deserves consideration:—'Salt meat,' says Mr. Power, 'is cooked on board in bulk; 96 lbs. are packed in a covered galvanized iron vessel of size just sufficing for the meat and the necessary water; the latter, when the meat is added to it, being nominally at boiling point. The iron vessel with its contents is then placed over the central fire-area of a stove of the "kitchener" type, and is assumed to be retained there from 8.30 a.m. until 12.30. Now, it will not be disputed that meat thus cooked on a large scale and in bulk cannot, except after very prolonged boiling, be equally cooked throughout. And the larger the mass of meat and the more closely it is packed into the cooking-vessel, the longer will be the time necessary for the heat to penetrate into the interior of the meat, so as to insure complete cooking. Hence, in the case of 96 lbs. of meat, packed into a vessel of not many gallons capacity, it may well be that pieces in the interior did not, during four hours' cooking, attain a temperature adequate to destroy the life of trichina parasites.' Here, for the present, we must leave the subject, merely remarking in conclusion that, inasmuch as trichinosis has thus been shown to resemble in many essential features enteric fever, Medical Officers of Health will need for the future to be on their guard in diagnosing cases or outbreaks of continued fever where the evidences of typhus, enteric, or relapsing fever are inconclusive.

At the Latchingdon (Essex) Petty Sessions, Emma Spells, a baker, was charged with adulterating a 4lb. loaf with no less than 1.305 grains of alum. She was fined £10 and costs.

SANITARY OFFICERS' ASSOCIATION.

ON the 10th inst. the annual and special general meeting of the members of the above Association was held at the office of the Chief Inspector of Nuisances, Council House, Birmingham. There was a large attendance of members; Mr. John Lowry, Sanitary Inspector of Tettenhall, near Wolverhampton, was unanimously appointed President, and Mr. Frederic Booker, Chief Sanitary Inspector, Birmingham, Secretary for the ensuing year.

This Association, which consists of Inspectors of Nuisances and other officers engaged in the Health or Sanitary Department of Urban or Rural Sanitary Authorities, seeks to attain its objects by means of social intercourse and communication with each other, the reading of papers and exchange of experience on sanitary matters, thereby enabling its members to acquire a more extended knowledge of sanitary science, and the best methods of inspection and mode of procedure in dealing with nuisances injurious to health, and of carrying out the provision of any Act, Bye-Law, or Regulation in force of, which it is the duty of a sanitary officer to take cognisance.

Mr. John Turner, the Chief Sanitary Inspector of Bury in Lancashire, attended, and exhibited a model of a patent dividable closet guard and deodoriser, whereby urine and similar substances in a liquid state may be intercepted and separated in such a manner, that the residue or solid matter does not become offensive whilst contained in the pan or receiver.

Great interest was manifested in Mr. Turner's new method of collecting and dealing with excrementious matter; and he promised to further explain his patent to the members at their next quarterly meeting to be held on the second Saturday in July. The remainder of the time of meeting was occupied in the discussion and adoption of a code of rules for the government of the Association.

THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

AT the meeting of this Society, held on March 19, Dr. Bristowe, President, in the chair, the minutes of the last meeting were read and confirmed. The Council presented a report on the following subjects:—The power of Vestries or District Boards to add ten years in computing the superannuation allowance to retiring officers in accordance with the terms of sec. 5 of the Superannuation Act. 2. The advisability of requesting the President of the Local Government Board, either by a deputation from the Society, or by a petition, to introduce a Bill into Parliament with the object of making the appointments to the post of Medical Officer of Health throughout the country permanent. 3. The best means by which information of the existence of cases of infectious disease in one metropolitan district can be communicated to the Medical Officers of Health of the other metropolitan districts. 4. The Metropolis Water Bill. With regard to 1, the Council recommend that the Society take no further action at present. 2. The Council recommend the Society to express the opinion that it is desirable that the appointments to the post of Medical Officer of Health in extra-metropolitan districts should be made permanent. 3. Consideration of this subject was adjourned to the next meeting. 4. It is now unnecessary to report on this Bill. With reference to subject 2, Mr. Wynter Blyth remarked that while he was in favour of the recommendation of the Council, he thought that a wider view of the subject should be taken, and that sanitary areas should be made permanent, by which the office of Medical Officer of Health would be made permanent also. This subject was referred back to the Council for further consideration. The rest of the report of the Council was received and adopted. The following gentlemen were balloted for, and elected:—Dr. S. Saunders, Medical Officer of Health for the City of London, as a metropolitan member; Dr. F. W. Coates, Medical Officer of Health for Salisbury, as an extra-metropolitan member; Dr. G. B. Longstaff, Southfield Grange, Wandsworth; Mr. N. A. Humphreys, General Register Office, Somerset House, and Mr. Ernest Hart, as Associates. Dr. J. Shea, Medical Officer of Health for Reading, and Mr. H. A. Lawton, Medical Officer of Health for Poole, Urban, Post, and Rural Sanitary District, were proposed as extra-metropolitan members.

Dr. Churchill showed for Mr. Dunning, of Fulham Road (the maker), a closet designed with a view to complete isolation from all drain connection. He remarked that sanitary engineers are now generally agreed that the wastes of sinks, baths, etc., should be 'cut off', and flow immediately into trapped receivers outside the house, and that the connection from the waste to the receiver should be as short as possible, reducing to a minimum the possibility of foul pipes inside a house. This system, though found to work well, has so far not been capable of application to the foulest of all drains, viz., the soil-pipe. Whatever arrangements may be made for ventilating drains and soil-pipes, it is found impossible to do so effectually, even with cowls, during the prevalence of fogs in winter, and sultry weather in summer. Dr. Churchill further showed that when the draught of air is greatest up a soil-pipe, then is the danger of sewer gas finding its way into the house, as follows:—One of the upper closets is put in action, the descending column of water, instead of being cylindrical, and clinging to the sides of the pipe, as we should suppose, is obstructed in its descent by the rush of air in the up-cast shaft. The water, forming a solid column, forces the air before it, the result being that the traps of the lower closet are momentarily unsealed, and sewer air passes into the house, sometimes imperceptibly, and at others with a rush through the overflow pipe. This has repeatedly occurred in houses constructed upon the most approved sanitary principles. Mr. Dunning has constructed this closet so as to avoid all these objections.

Taking advantage of the Newtonian law of gravitation, the contents are allowed to fall direct into the mouth of the trap when the valve is opened. The basin is provided with a lip which fits into the framework of the closet, and with a modified valve box attached is suspended about an inch above the mouth of the trap. A current of air is admitted by a louvre shutter, or, in awkward situations, by an air tube let into the external wall. The air circulates round the basin and over the trap, flushing out any foul air that may have passed through or be lodged in the mouth of the trap. Ample provision is made for protecting the fittings from frost by the adjustment of the louvre, which by a lever is worked from the inside of the closet. In very exposed situations, in the country for example, it may be found needful to embed the closet in felt. The mechanical arrangements for flushing and opening the valve are

the same as those in general use. A sheet of glass may be let into the framework behind the riser for the purpose of inspection. It is also desirable to have a rabbeted hatchway in the sealed chamber under the seats, for repairs, oiling, etc. The trap is provided with a funnel-shaped mouth. In reply to Mr. Wynter Blyth, Dr. Churchill explained that the cost would be little, if any, more than that of ordinary valve closets. There would be one item of expense less, as it would be unnecessary to fit lead safes to these closets. Housemaids would not be able, as so frequently happens, to overflow and cause an accumulation of slops under the framework, because the lip of the basin fits securely into the air-tight underseat. By hinging the seat and fastening it back, it will be kept clean, and the slops can be more easily disposed of. The same gravitation principle is serviceable for sinks, baths, etc.

Mr. Washington Lyon exhibited and explained a model of an improved disinfecting and purifying apparatus, by means of which a heat of 220° and upwards in the interior of an article—a mattress, for instance—may be raised by high-pressure steam in a few minutes, without injury to the fabric. The meeting then adjourned.

MEDICAL OFFICERS' REPORTS.

ASTON MANOR.—Mr. May's report is eminently practical, and is very precise in recording the amount of sanitary improvement accomplished. A large number of nuisances were abated, active progress was made with the main outfall sewer, a large additional number of houses had their drains connected with the sewers, the ventilation of the sewers was improved, and a number of surface wells were disused, during the year 1879. A disinfecting chamber was provided, the slaughter-houses were improved, and progress was made with a code of bye-laws. There still remains, however, a great deal to do in this rapidly-growing suburb of Birmingham, and the provision of a hospital for infectious diseases, and an improved method of excrement removal demand first consideration. During the year, 2,163 births and 885 deaths were registered in the district, equal to rates of 42.0 and 17.1 respectively. The latter is 1.7 lower than the average of the last eight years, and the lowest yet recorded. The mortality from zymotic disease was not heavy, though they were very prevalent. Scarlatina caused 47 deaths, measles 15, diphtheria 21, whooping-cough 107, while only 17 occurred from diarrhœa, and 2 from typhoid fever.

BAKEWELL RURAL.—For the northern division of this district Dr. Fenton has a fairly satisfactory report to make. During 1879 the births of 292 children, and the deaths of 222 persons were registered, as against 328 and 216 in 1878. The birth-rate was 25.06, and the death-rate 18.9 per 1,000 of the estimated population. Zymotic diseases were fatal in only six instance, 2 being cases of whooping-cough, 2 of typhoid fever, and 2 of diarrhœa. No additional works of water supply or sewerage were undertaken during the year, but drainage works by owners of property were carried out in almost every township. Much care would appear to be taken in the removal of nuisances.

BEDFORD.—Dr. Prior has but little to record in his report on this district. The general death-rate (17.4) was low, the infant mortality was low, the only zymotic disease at all prevalent was diphtheria, which caused 10 deaths, and the main sewers and waterworks were maintained in perfect order. The materials for an annual report are, therefore, all but entirely wanting.

BEDFORD RURAL.—In this district there were 467 deaths during the year, equal to a death-rate of 18.6 per 1,000, or about 1 per 1,000 in excess of 1878. The deaths under 5 years of age numbered 138, and those from zymotic diseases 25. The zymotic deaths were for the most part scattered, and nothing like a serious epidemic occurred. Scarlatina caused 3 deaths, measles 2, enteric fever 6, and diarrhœa 6, four of these latter being in persons over 70 years of age. The Water Act of 1878 is being put in force in the district with varying success, not a little opposition and evasion having to be encountered. The bye-laws for new buildings, now under consideration, would seem to be much wanted.

GLOUCESTER.—The deaths in this district during 1879 exceed those of 1878 by 1.8. This is not a large proportion when it is stated that the population of the city is rapidly increasing, no less than 200 new houses being taken into occupation during the year. The deaths from diseases of the respiratory organs numbered 183 out of a total of 746, being an increase on the previous year of 64. The total number of deaths from zymotic diseases was 60, but no facts are given as to the circumstances of the occurrence of any of the cases, an omission which we would suggest to Mr. Wilton it would be desirable to rectify. An increased water-supply, and a public slaughter-house, seem to be required for the district.

HARKSMERE RURAL.—It is unfortunate for Dr. Barnes that his first complete year of office shows a very high death-rate, 21.1 per 1,000 as against an average of 17.7. Zymotic diseases appear to have been very prevalent in the district and its neighbourhood during the year. Scarlatina was present in fourteen parishes, in one of which no less than sixty-two cases and four deaths took place. The disease appears to have been first imported into the district from London, and to have then spread from one place to another. Altogether 178 cases in 70 families were brought to the knowledge of the Medical Officer of Health. Fifteen cases of typhoid fever occurred in seven families in four parishes, the majority of the cases being due to polluted water. An outbreak of diphtheria in three parishes attacked twenty-nine persons, and killed four. Dr. Barnes believes the outbreak to have had a filth origin; and the disease was undoubtedly largely spread by the public elementary school. Dr. Barnes has evidently done his best in face of these numerous epidemics, and it is satisfactory to find the authority following him, though at a distance. A commencement seems to have been made with good effect in the enforcement of Mr. Brown's Water Act in the district.

HELMSLEY RURAL.—Dr. Bruce Low's report upon his division of the Helmsley rural district for 1879 is an exceptionally interesting one, and the various sanitary events of the year are carefully and intelligently reported. The mortality was comparatively small, the death-rate being 17 per 1,000, or nearly two below the average. Two-thirds of the deaths occurred in the first half of the year, an excess which Dr. Low ascribes to climatic causes. During this period the deaths from respiratory diseases numbered one half of the total deaths registered, the deaths in infants and in children under five years show a gratifying diminution. The percentage of illegitimacy is still, however, enormously large, and some terrible

stories are told of the cruelty and neglect of baby-farmers. Only two deaths occurred from zymotic disease, not a single death occurring from diarrhœa; but scarlatina was present in several villages, and whooping-cough was prevalent towards the end of the year. A scheme of water supply for one village has been completed, but there are several other places that need attention in this repect.

LONGTOWN RURAL.—Not much is to be said about a district where more than a third of the deaths are in persons over 60 years old, and when the only fatal cases of zymotic disease are seven deaths from measles. Yet, Mr. Walker contrives to make a satisfactory report as to the sanitary circumstances of the district, and the means adopted for their improvement. The number of deaths from chest diseases is excessive, and it would be well if the spouting of houses were made more general, as Mr. Walker suggests. The general death-rate of the district was 17.29 per 1,000, against 16.72 in 1878.

MAIDSTONE.—In Mr. Adams' report the sanitary wants of this borough are set out with great care and detail, and there certainly seems ample work before the Authority. Many of the back slums are stated to be 'as bad as can be, tumble-down, filthy, and without pretence to sanitary provision'. There is an almost universal neglect of proper disconnection between the house-drains and sewers; privy-pits and cesspools still exist, even in the densest parts of the town, and there is no organised plan for the disposal of refuse. A new system of drainage has, it is true, been brought into operation, but Mr. Adams very properly insists on a constant supply of water being provided for the closets before the system can be considered satisfactory. There is nothing remarkable in the death statistics of the year, except the large number of deaths from diseases of the respiratory organs (166 out of a total of 569). The mortality from these causes was doubtless swollen by the unusually severe and protracted winter, and by the dampness of the site of Maidstone. The general death-rate was 19.52 per 1,000. Of the zymotic diseases whooping-cough was the most fatal, causing eighteen deaths.

BRANDON AND BYSHOTTLES.—In this colliery district the general death-rate was not high, but the proportion of infantile deaths was unduly excessive. Of 172 deaths, in a population of 10,690, no less than 64 were in infants under one year, and 105 in children under five years. The prevalence of scarlatina, whooping-cough, and diseases of the chest, doubtless accounted for much of this mortality, but we should have liked to have seen some comments on the subject in Mr. Blackett's report. In the colliery villages of the district, scavenging is attended to by the colliery owners; but to the houses not occupied by colliers the scavengers do not go, and great difficulty seems to be occasioned in securing the removal of the nuisances which occur in consequence. Mr. Blackett's advice that a proper plan of each ward should be made and maintained, showing all houses, buildings, and drains and sewers thereon, has our warm approval.

BURY ST. EDMUND'S.—Mr. F. W. Clarke's second report on this district maintains the high standard of his report for 1878. The work of the year is recorded in a plain and straightforward fashion, and the sanitary wants of the district are briefly, and yet forcibly urged. Foremost amongst the latter is a system of public scavenging, which, in a town of such dimensions, we are surprised to find is not undertaken by the Authority. Accumulations injurious to health inevitably occur when the duty of removing filth is left to be performed by the occupier; and in a place like Bury St. Edmunds, where excrement is stored in deep pits sunk in the chalk, we can readily understand that grave nuisance may arise, as Mr. Clarke states that it does. We would, therefore, cordially endorse his advice that the excrement removal should be effected under the care and management of the Sanitary Authority. The Medical Officer expresses, indeed, his fear that the local Bye-Laws relating to the removal of refuse, and the cleansing of privies, etc., are likely to remain more or less a dead letter, until all these matters are brought under the control of the Authority. The cost of the reform would not be nearly so great as is imagined, and the advantage to the community would be incalculable. During last year, there were 332 deaths in the town proper, equal to a rate of 21.2 per 1,000, which is too high for a district with such natural advantages. Zymotic diseases were fatal in 23 cases, 16 of which were of scarlatina. This disease prevailed rather extensively in the district during the first half of the year, and seems to have been greatly spread by means of schools. The newly established infectious hospital was of much service in enabling certain cases of small-pox and scarlatina to be removed from overcrowded houses in the poorer quarters, and thus preventing the infection from spreading. A disinfecting apparatus, which has also been set up, has proved very useful, no less than 686 articles being disinfected by its agency during the year.

CARLISLE.—Dr. Elliott's annual 'report' consists exclusively of a string of tabular statements. From these we learn that the number of births in the city during last year was 1319, and the number of deaths 819, equal to rates of 37.7 and 23.5 per 1,000 respectively. Seventy-six deaths were due to zymotic diseases, of which 22 were referred to measles, 22 to whooping-cough, 11 to typhoid fever, and 2 to typhus. No particulars are of course given of any of the cases, nor is anything said about the progress of sanitary improvement in the district. The 'report' thus loses almost all its value.

CONSETT.—A curious state of things is described in the annual report on this district. The death-rate was only 12.4 per 1,000 of the estimated population (Mr. Renton miscalculates it as 11.1), whilst a third of the children died under one year of age, and another third in persons over 60 years. A grave nuisance is reported as occurring at the sewer outfall; and the yards of some of the streets are described as 'so appallingly filthy, that words cannot describe their fearful condition'. Considering the prolonged depression of trade in the iron and coal trades, which are the staple of the district, has not Mr. Renton considerably over-estimated the population in calculating so very low a death-rate?

DERBY.—The chief feature in Mr. Iliffe's report for 1879 is the terrible mortality from scarlet fever. During the year no less than 244 deaths occurred from this disease alone, and yet no attempt was made to utilise the infectious hospital which exists in the district, because the 'details of construction and management are so faulty as to forbid its adoption as a place to accommodate scarlet fever patients in severe weather'. Mr. Iliffe tries to excuse the Authority for not opening the hospital, in view of the grave difficulties of inducing parents to part with their children suffering from scarlet fever; but he seems to have put too narrow an interpretation

upon the compulsory powers of removal possessed by the Authority. For the rest, the report chronicles good work in the district. A large number of house drains were disconnected from the sewers; the sewers are being ventilated by means of open grids; a mortuary was completed, and is ready for use; a disinfecting chamber has been provided; an improved method of collection of ashes and house refuse has been put in operation, and no less than 2,168 nuisances were removed during the year. The death-rate, mainly in consequence of the large number of deaths from scarlatina and lung diseases, was very high,—24.7 per 1,000, exceeding that of 1877 and 1878 by 3.7 and 4.4 respectively. To six of the principal diseases of the zymotic class 380 deaths were referred, equal to a rate of 4.7 per 1,000 living. Measles (39 deaths) was somewhat more prevalent than in 1877 or 1878; whooping-cough (43 deaths) was most fatal in the first quarter; diphtheria was fatal in eight instances, 19 deaths were registered from typhoid fever, and the mortality from diarrhœa (22 deaths) was unusually small, in consequence of the cold and wet weather. Mr. Iliffe's report is particularly full and painstaking throughout.

HOLSWORTHY RURAL.—Mr. Linnington Ash's report upon this district is very full and complete, as his reports always are. It shows a satisfactory amount of activity on the part of the sanitary officers, though there is still very much to be done. Mr. Ash summarises as follows the sanitary defects of the district:—deficient and defective water-supply, bad drainage or none at all; absence of sufficient privy accommodation, and bad cottages, habitations, and dwellings. The number of deaths registered in the district during the year was 200, equal to a death-rate of 21.2 per 1,000, against 21.8 for the preceding year. Six of the seven principal zymotic diseases existed in the district, and one or more deaths were registered from all. The chief outbreaks were—one of scarlatina, which, to a greater or less extent, existed in the Union during the whole year, and one of diphtheria, which caused nine deaths in all, and was mainly spread by the village schools. Mr. Ash has some very interesting conclusions with regard to this outbreak, which may be valuable to those engaged in investigating the subject. Amongst other matters dealt with in the report are—the condition of the existing graveyards, and the sending of large quantities of diseased meat to the London markets.

MOUNTAIN ASH.—In this district the birth and death-rates for 1879 were 36.8 and 18.6 per 1,000. The mean annual death-rate for the three years previous to 1879 was 19.2, and for the three years before that period 27.3 per 1,000, so that the district is evidently progressing. No death occurred last year from either small-pox, measles, typhus, or scarlet fever, three only from whooping-cough, and two from typhoid, the deaths from which show a steady decrease. We should have liked, however, to have had from Mr. Davies some particulars as to the sanitary circumstances of the district, and the measures taken for their improvement.

WORKINGTON.—Important sanitary work is being done in this district under the auspices of Dr. Ward, but there is still a great deal to be compassed. A supply of lake water has been provided for the town, and extensions of drainage are being carried into effect; but individual properties (as testified by the occurrence of preventable disease therein) are sadly in need of improvement. During the year 1879 there were 329 deaths in the district, or 33 more than the year before. More than the whole of this excess took place in the first half of the year, due, no doubt, to the mortality from diseases of the respiratory organs. There has been a marked decrease in fever of a typhoid type since the introduction of the lake water, and the other zymotic diseases, with the exception of whooping-cough, do not appear to have been prevalent. Dr. Ward devotes much attention to the effects of impure house-atmosphere on the health of the community, and says that the result has been forced upon him that 'one of the most potent physical factors in the production of diseases of the respiratory organs, the brain and nervous system, as well as of tubercular and zymotic diseases, has been a marked impurity of the air of the bedroom, where the child or sick one has passed so great a part of life'.

LAW REPORTS.

BRIEF NOTES OF USEFUL CASES.

NUISANCE FROM SEWER.

1879. *Riddell* v. *Spear.* "Public Health Act, 1875," ss. 91, 111.—Sewer constructed by a landlord through land leased by him to a tenant, but without tenant's consent, and without compensation being made to him—Sewer became vested in Local Authority—Sewer stopped up by tenant—Nuisance thereupon created—Held that the tenant was rightly convicted as the person by whose act the nuisance arose or continued, and this, although the *locus in quo* of the nuisance was elsewhere. (40 L.T., 130; 43 J.P., 317.)

ELECTION OF GUARDIANS.

1879. *Bell* v. *Morson.* Filling up voting paper without Voter's Authority—Held that though there might have been evidence to convict of fabricating the voting paper, the Appellant was wrongly convicted of assuming to act, as it was not proved that the voter did not afterwards agree to what had been done. (40 L.T., 128; 43 J.P., 638.)

LIBEL ON CLERK OF BOARD.

1879. *Keight* v. *Hill.* Complaint in writing to Guardians by the defendant, their clerk, that the plaintiff, an assistant clerk, had neglected his duty—Whereupon plaintiff dismissed—Action of slander—Held that the complaint made by the defendant was a privileged communication if he was acting in the course of his duty, and without malice. (43 J.P., 176.)

COMPUTATION OF TIME.

1879. *Migotti* v. *Colville.* A sentence of one calendar month expires on the day preceding the same numerical day in the following month; if the following month has not sufficient days, then on the last day of the following month—Such a sentence passed on October 31 expires on November 30. (48 L.J., C.P., 695; L.R., 4 C.P.D., 233; 40 L.T., 747; 43 J.P., 620.)

BUILDING BY-LAWS.

1879. *Workington L. B., In Re.* "Public Health Act, 1875," s. 158.—Plans for new street in a certain direction duly deposited under a Building By-Law—Disapproval by Local Authority, and refusal to state the grounds on which the disapproval was based, otherwise than that the Board wished the proposed street to run in a different direction—*Mandamus* granted to compel the Board to give its reasons.

but doubts expressed by the Court (1) whether the Act required reasons to be assigned by the Board for its refusal; and (2) whether the Board could insist on the direction of a street being altered. (*Times*, April 9, 1879.)

NOXIOUS TRADE.

1879. *Passey* v. *Oxford L. B.* "Public Health Act, 1875," s. 112—A place where bones were deposited after collection, Held within the Act, on proof of offensive smells proceeding therefrom, notwithstanding that the bones were not subjected to any manufacturing process—Conviction affirmed. (43 J.P., 622.)

POLLUTION OF STREAM.

1879. *Glossop* v. *Heston and Isleworth L. B.* Stream polluted by sewage, which it was alleged that the Local Authority ought to have excluded from the stream by sewers constructed for the purpose—Injunction to restrain the continuance of the user of the stream as a sewage outfall refused—The plaintiff might have proceeded by way of application for a *mandamus* to enforce the construction of sewers. L.R., 12 Ch.D., 102; (40 L.T., 736; 44 J.P., 36.)

HIGHWAY.

1879. *Fearnley* v. *Ormsby.* "Highway Act, 1835," s. 72—Stones placed on a road by a Surveyor allowed to remain at night insufficiently fenced and lighted—Held that the Surveyor was properly convicted under s. 72, although he might also have been guilty of an offence under s. 56. (L.R., C.P.D., 136; 43 J.P., 384.)

LIBRARIES.

1879. *Riley* v. *Read.* "Working Men's Reform Club," Over Darwen, never having been furnished as a dwelling-house, or been slept in at night, held not assessable for Inhabited House Duty, although one floor was used during the day time by an Auctioneer for business purposes. (48 L.J., Ex. 437; L.R., 4 Ex.D., 100; 40 L.T., 398; 43 J.P., 480.)

HOSPITAL.

1879. *Bramwell* v. *Lacy.* A covenant not to carry on any trade, business, or dealing whatsoever in a house, is broken by using such a house as a hospital for out-patients. (48 L.J., Ch., 339; L.R., 10 Ch.D., 691; 40 L.T., 361.)

MARKET.

1879. *Elwes* v. *Payne.* Exclusive market rights vested in plaintiff and predecessors in title for 150 years and longer—Interlocutory injunction to restrain proposed weekly sales by auction in same place, but on a different day, refused; but defendant to keep an account of his sales till the trial of the action. (48 L.J. Ch., 831; 41 L.T., 118; L.R., 12 Ch.D., 468.)

TRAMWAYS.

1879. *Murdoch* v. *London Street Tramways Co.* "Tramways Act, 1870," s. 56; Special Act, "London Street Tramways Act, 1877," 40 & 41 Vict. c. ccxix, s. 24—Tramway out of repair—Held that a private individual could not sue for the penalty. (*Times*, May 30, 1879.)

REPAIR OF BRIDGE.

1879. *Metrop. B. W.* v. *South Eastern Railway Co.* "Metropolis Bridges Act, 1877," 40 & 41 Vict., c. 99—Bridge freed of tolls by pecuniary compensation, Company to retain ownership and to repair—*Mandamus* to repair granted. (*Times*, Nov. 11, 1879.)

RIGHT OF WAY.

1879. *Reg.* v. *Ward.* Indictment for obstructing an alleged Right of Way over a causeway leading to sea-shore—Powers of Local Board—Question of evidence of dedication—New trial granted on the ground that the verdict for the Crown was against the evidence. (*Times*, June 28, 1879.)

NOXIOUS VAPOURS.

CHARLTON V. RUSSELL AND OTHERS.

This case, which was heard at Newcastle before Mr. Justice Lush, was an action by a farmer at Low Walker to recover compensation for alleged damages to his crops by noxious vapours emitted from the defendants' chemical works.

The plaintiff had six acres of barley, seven acres of oats, and fourteen acres of wheat, growing on his farm at Low Walker, on the north side of the Tyne, which he alleged was very seriously affected in August and September of last year by noxious gases emitted from the defendants' works. Both the yield and the quality were affected, and he claimed £44 9s. 3d. for the loss he had suffered. Messrs. Russell's and Messrs. Hill and Son's works are on the same side of the Tyne as the plaintiff's farm, and Messrs. Tennant's works are at Hebburn-quay, on the opposite side of the river, but by reason of their having two principal chimneys at a higher elevation than the other defendants' single chimneys, on the same side of the river, the plaintiff considered the damage had been caused equally by all the defendants. The defendants denied that noxious gases had been emitted from their works, and sought to show that the bad crops were due to natural causes and the inclemency of the season.

For the defence, a number of experts were called to prove that the several defendants conducted their works on the best principles and with the best appliances, and that the gases emitted were not injurious to vegetation. The Alkali Act, 1874, required Messrs. Tennant and Messrs. Russell not to permit more than one-fifth of a grain of muriatic acid per cubic foot of smoke to escape from their chimneys, and the tests which were taken three or four times a week showed that Messrs. Tennant had always been within the limit, and Messrs. Russell considerably below it. Messrs. Russell's and Messrs. Hill's chimneys were about half a mile and Messrs. Tennant's about a mile distant from the plaintiff's fields, and the gases which were allowed to escape were so diluted they were in no sense poisonous or injurious. The plaintiff's bad crops were due to the badly-drained, impoverished condition of the land, and the wet season, which had affected all farmers.

The jury found a verdict for the plaintiff, and assessed the damage against each defendant at £6 13s. 4d.

The Judge reserved questions of costs for further consideration.

CHICORY AND COFFEE.

This was an appeal under the Adulteration Act, raising a question of some general interest, having reference to the mixing of chicory and coffee. A grocer had sold half a pound of an article of food called coffee to the prejudice of the purchaser, 'the same not being of the nature, substance, and quality of the article demanded by the purchaser', contrary

to the terms of the Act 38 and 39 Vic., cap. 63. The case was stated thus by the magistrates:—

'It was proved on the part of the respondent that on the 23rd of May 1879 a police constable went to the appellant's grocer's shop in Faringdon, in plain clothes, and asked one of appellant's assistants to supply him with half a pound of coffee. The assistant took a quantity of what appeared to be coffee from the bulk contained in a canister and weighed it, after which it was wrapped up in paper and delivered across the counter to the purchaser, who paid ninepence for the half pound, this being the full price for pure coffee. The purchaser then asked the assistant to call his master, the appellant, which he did, and the appellant came to the purchaser, who then informed him that he had purchased the article for the purpose of having it analysed. The appellant thereupon, while the packet was still on the counter, called the purchaser's attention to a label affixed to the outside of the paper in which the article was wrapped, on which the purchaser noticed for the first time the following printed words,—"This is sold as a mixture of chicory and coffee". The words were printed in distinct and legible characters, and the label was affixed in a conspicuous position on the outside of the package. The purchaser then said he had asked for "coffee", and not coffee and chicory. He then, in pursuance of the provisions of the 14th section of the said Act of the 38 and 39 Vic., cap. 63, informed the appellant of his intention to have the article analysed by the public county analyst, and offered to divide the same into three parts, and deliver one of such parts to the appellant; but this the appellant did not require him to do. The purchaser had no suspicion that he had received anything but pure coffee until his attention was drawn to the label by the appellant. The article was afterwards submitted for analysis to Mr. W. F. Donkin, the public analyst for the county of Berks, who by his certificate declared the result of his analysis in the following terms,—"I am of opinion that the said sample is a mixture of about sixty parts coffee with about forty parts chicory". The appellant was represented by a solicitor, who submitted that the appellant was protected by the 8th section of the Act, with the terms of which he had fully complied by having at the time of delivering the article supplied to the purchaser a notice by a label, distinctly and legibly printed, that the same was mixed, and the appellant's solicitor cited and relied on the case of "Sandys, appellant, *v.* Small, respondent", decided in the Queen's Bench Division on the 26th of June 1878 (3 'L. R.', Q. B., 449), in support of his contention, and urged that on the authority of this case it was unnecessary to call the attention of the purchaser to the label. The 8th section of the Act provides that "no person shall be guilty of any such offence as aforesaid in respect of the sale of an article of food or a drug mixed with any matter or ingredient not injurious to health, and not intended fraudulently to increase its bulk, weight, or measure, or conceal its inferior quality, if at the time of delivering such article or drug he shall supply to the person receiving the same notice by a label distinctly and legibly written or printed on or with the article or drug to the effect that the same is mixed". We, however, having regard to the fact that the purchaser asked for coffee, and was supplied with an article consisting of only sixty per cent. coffee and forty per cent. chicory, without having his attention called to the label, and without, in fact, seeing it until the purchase was completed, and also to the fact that the price he paid for the said article was a usual and fair price for pure coffee, and much more than would have been given for coffee mixed with chicory to the above extent, and also conceiving that the case cited by the appellant's solicitor, which referred to a mixture of water with whisky, was not applicable to the case before us, were of opinion that the article sold was so mixed with intent fraudulently to increase its bulk, weight, and measure, and considered that, therefore, the appellant was not protected by the said 8th section of the Act, and we convicted him in the mitigated penalty of £5 and costs as before mentioned. The questions of law arising on the above statement for the opinion of this Court are:—Whether the admixture of chicory with coffee to the extent of forty per cent., the same being sold at the usual price of pure coffee, is to be considered a mixture of an ingredient or matter intended fraudulently to increase its bulk, weight, or measure within the meaning of the 8th section of 38 and 39 Vic., cap. 63, so as to deprive the appellant of the protection that would be otherwise afforded him by the said section. And whether, assuming this question to be answered in the negative, after the completion of the sale and delivery of any mixed article sold as pure, but before its removal from the counter, the seller can avail himself of the protection afforded by the latter part of the section by calling the purchaser's attention to the notice of mixture printed on the label. If the Court should be of opinion that such conviction was legally and properly made, then the said conviction is to stand; but if the Court should be of opinion otherwise, then the said information is to be dismissed.'

Mr. Justice Lush said that the judges quite agreed with the magistrates in their finding. No one could tell the proportion of chicory. Mr. Justice Manisty said that the mixture was sold for the full price of coffee, and suppose the purchaser could not read? Conviction affirmed.

NOTES ON BOOKS.

The Truth about Vaccination. By ERNEST HART, pp. 87. London: Smith, Elder & Co., 1880.

The second title of this pamphlet, 'An Examination and Refutation of the Assertions of the Anti-Vaccinators', sufficiently explains its scope and purpose. The little book aims at bringing together the copious evidences in favour of vaccination which are for the most part scattered about in different blue-books and reports, and which have never yet been collocated in a handy and compendious form. It is also designed as an answer to the disingenuous mis-statements of the anti-vaccinators, and with this view each objection urged against vaccination is separately analysed, and facts brought forward to prove its fallacy. The book contains six chapters, dealing respectively with small-pox uncontrolled by vaccination, the objections to vaccination, the alleged mischief from vaccination, the diminution of small-pox mortality since the introduction of vaccination, the protection against small-pox afforded to the individual by vaccination, and, lastly, revaccination and its importance. A summary of conclusions, and a number of appendices and tabular statements complete the book. There is a very large class of officials and local authorities, as *e.g.*, magistrates, guardians of the poor, public vaccinators and vaccination

officers, to whom a knowledge of the real facts of vaccination (such as this little work is designed to afford) is most essential for the proper performance of their often difficult functions.

Sick Paupers aad their Medical Attendants. By C. H. London: Home and Co., Edgware Road.

The object of this little pamphlet is to expose 'the fraud inflicted on the sick poor, and the ratepayer, in the employment by poor-law medical officers of unqualified assistants'. Mixed up with much that is incorrect and irrelevant, there is a strong undercurrent of truth in the anonymous author's remarks about the too frequent employment by poor-law medical officers of unqualified assistants. Whilst almost every other department of poor-law work is rigidly inspected, the medical relief of the poor is subject to no sort of supervision whatever, and it is small wonder if, under these circumstances, abuses creep in. The author goes as far as to describe the existing system as a costly sham, by which the ratepayer suffers much and the sick pauper profits little. Without being so sweeping as this, we are certainly of opinion that searching enquiry ought to be made as to the systematic delegation of this work by district medical officers to unqualified persons, in complete defiance of the official regulations, and as to the reasons why no steps are taken by the Local Government Board to see that their own orders are carried into effect.

The Future Influence of the Johns Hopkins Hospital on the Medical Profession of Baltimore. By JOHN VAN BIBBE, M.D. Baltimore, U.S.A., 1879.

In this little *brochure* the author expresses in earnest language the hope that the magnificent hospital which is now rearing its stately walls at Baltimore will tend to raise the tone of medical education in America.

The Yellow Fever Germ on Coast and Inland, by H. F. CAMPBELL, M.D.

This is an extremely interesting and clever paper, read before the Medical Association of Georgia last year, on the subject of yellow fever in connection with ship and railroad quarantine. The author combats strongly the alleged local origin of yellow fever, and adduces many cogent arguments in favour of the germ theory of the disease.

An Incredible Story. By T. J. NELSON. London: J. Truscott and Son. 1879.

Under this heading the City Solicitor, who is also the Chairman of the Lower Thames Valley Sewerage Board, has detailed, in a letter addressed to the late Prime Minister, the various unsuccessful efforts made by the sanitary authorities on the banks of the Thames to carry out the Act of 1867, forbidding the passage of sewage into the river. Mr. Nelson writes in a vigorous and somewhat sarcastic fashion of the official strangling of each and every scheme that has been submitted to the decision of Whitehall, but his chiefest efforts are of course reserved for the summary rejection of the Thames Valley Sewerage Bill by Parliament last Session. We have already commented at length on the matter, and need not, therefore, go over the same ground again; but Mr. Nelson's pamphlet is well worth reading, if only as an illustration of the difficulties which even the most earnest body of persons may find in endeavouring to comply with the law.

CORRESPONDENCE.

[*All Communications must bear the signature of the writer, not necessarily for publication.*]

THE POLLUTION OF WATERCOURSES.

May I ask you to insert the enclosed copy of a letter I wrote to the rural Sanitary Authority of Hitchin Union, in which Stevenage is situated, to show that the Lee Conservancy Board does its best to preserve the purity of the water supplied, and does not allow it 'to remain' in 'the polluted condition', as the outside public would believe the Lee to be from your leader on this head in your issue of February 15.

It is quite true that Stevenage has done nothing to prevent the small amount of sewage, a portion of its discharges, from going into ditches. But pray do not lead the public to think that 2,500 persons daily discharge their sewage into a main tributary of the Lee river, and that we have not done anything to prevent it.

It is not my duty to make people construct sewers.

I fully value the remarks in your leader as to the importance of keeping the upper tributaries of a river free from pollution, and know that accumulated filth festers away in ditches in dry weather, and is flushed out by sudden storms, and it is precisely this kind of pollution which I do all I can to abate.

Stevenage is a very remote case, and is not a good illustration of that which the writer wishes to convey. My ambition is to make the Lee watershed a model for the country, and certainly I protest against its being quoted as that which a watershed should not be.—Faithfully yours,

LAMOROCK FLOWER.

Feb. 24, 1880.

(COPY.)

Sanitary Engineer's Office.

Lee Conservancy, London, E.C.

July 30, 1874.

Dear Sir,—I have incidentally heard that steps are about to be taken for the re-sewering of Stevenage. You are, of course, aware that the sewage of this place pollutes the river Beane, one of the main tributaries of the Lee. My object in writing you is to save trouble in the future, and to remind your Board that I am aware of the fact of pollution, and to give you the opportunity of considering its abatement in any complete scheme which may be in contemplation.—Faithfully yours,

(Signed) LAMOROCK FLOWER,
Sanitary Engineer, Lee Conservancy Board.

The Clerk, Rural Sanitary Authority,
Hitchin Union, Hitchin, Herts.

VENTILATION OF DRAINS.

In the drawings of the Medical Officer of Health of Blackpool, the main principle seems to be to facilitate the escape of sewer gas from soil-pipe and house drain, from any available point, irrespective of locality. I should like to know whether this is not a plan open to objection; for it seems to me that there would be a constant risk of foul smells in the courtyard, and that the gas released from the openings in the soil-pipe, just beyond the syphon-bend, would be very likely to find its way in at any open window.

Then, again, is not any direct communication between the house and drain, even by the best indis-

rubber ring grid in the world, a thing to be avoided? Of course, we are in the infancy of sanitary growth in knowledge, and many needs breed many inventions, some based on theories which will not bear the test of practice.

I am particularly desirous of knowing how far this plan of open-air ventilation of drains in the rear of premises, at the ground level, is or is not a success, as it is a prominent question in a sanitary investigation I am now conducting. I should be obliged by any one who has had experience of it giving the results in the columns of the SANITARY RECORD.—I am, yours obediently,

J. MAY, Junr.,
Medical Officer of Health, Devonport.

March 3, 1880.

BLACKPOOL DRAINAGE.

As a sanitarian of thirty years' experience, I object to the arrangement of house drains as set forth in Dr. Leslie Jones's drawing, and for the following reasons:—First. As all soil-pipes and drains become in time foul, and the air passing through them becomes foul also, all the air that passes through the soil-pipe and drains will be delivered into the atmosphere in a foul and objectionable state. Second. Every time the water-closet is used, the flush water, forming, as it does, a sort of piston, forces the foul air before it, and by exhaustion draws into the air-pipe or openings fresh air behind it, and, as the result, foul air would be forced into the atmosphere at a low level periodically, and the occupier of the house would, as a matter of course, cover over the low level outlet, and the system, so far as ventilation is concerned, would become inoperative.—Yours truly,

HENRY MASTERS.

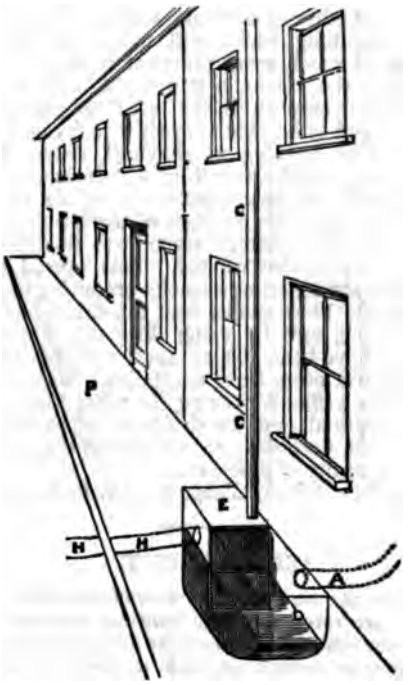
Bristol, Feb. 25, 1880.

VENTILATION OF SEWERS AND DRAINS.

With reference to the woodcut which accompanied my letter in your March number, I would remark that at the top of the ventilating-pipe, C, there are two small marks, as if the pipe turned off at an angle; these marks got in through error, as the ventilating-pipe should reach 'from the trap to three or four feet above the roof of the house'. It has been remarked to me that the trap, as shown, might do for the back-yard of a house, where there might be a wall to support the ventilating-pipe, C, whereas, if the drains ran off from the front of the houses in a street or terrace, as they often do, each ventilating-pipe, C, would, according to the drawing, stand by itself in the middle of the foot-pavement. I, therefore, send a small drawing to explain how the plan could be carried out in the front of a house; to make it more easily understood, I have drawn the trap on the ground level—the system would be the same if sunk a foot or two deeper, which would probably be the case in practice.

The length of the trap runs parallel to the frontage of the house, the tongue is at right angles to it, the house drain comes into the trap at the side of one half, D, and the town drain runs off from the side of the other half, E, the ventilating-pipe also going up from the latter; it would be painted the same colour as the house, and, if noticed at all, it would not be any more unsightly than the common rain-pipe.

Two writers having criticised Dr. Jones' plans for the ventilation of soil-pipes and house-drains, as shown in your February number, would you allow me to say a word or two on this subject. If the plan, as shown, is proposed for use at Blackpool, I should recommend the Borough Authorities to reflect before



they adopt it. Given a case of pressure in the sewers from a storm, high wind, or sudden heavy rain, what is there to prevent the sewer gas from being sent up into the house? Given, on the other hand, a case of perfectly still, sultry weather, 'without a breath of air', the heat of the house would cause a draught inwards, and, in each case, the sewer gas would probably accumulate in the bend of the soil-pipe under the closet. By that time the sewer gas may be so modified by air coming down the ventilating-pipes, 1, 2, and 7, as to become less hurtful; still I think that the Authorities at Blackpool might easily find a better and safer plan of sanitary appliances, etc., than the one proposed by Dr. Jones.

J. R. T.

CYPRUS.

It is a matter for congratulation that Dr. Frederick W. Barry, the energetic and intelligent Medical Officer of Health for the Craven Combined District, has been appointed by her Majesty's Government principal Medical Officer of Cyprus 'the blessed, the happy, the beautiful'. Soon after the acquisition of this island, I wrote a letter, which was inserted in the *Times*, suggesting that, as a remedy for malaria and mosquitoes, the Eucalyptus should be freely planted, and that, under intelligent supervision, this island might eventually become the sanatorium of the Mediterranean for the English, in place of sewer-air contaminated Cannes, Nice, Mentone, Algiers, etc.—'whited sepulchres, which, indeed, appear beautiful outward, but are within full of dead men's bones and of all uncleanness'—but to insure the investment of capital and consequent success, the tenure of possession should be permanent as well as the office of Medical Superintendent.—Faithfully yours,

Norfolk Square, W. P. HINCKES BIRD.

DETECTION OF LEAKAGES IN DRAINS.

I beg to support your objections, as stated at page 342, against the adoption of Lieut.-Col. Hale's plan of the use of ether in detecting leaking drains. The use of something which will make 'an abundant smoke' is of much more practical service. I have been using the smoke test now for several years back, but it is only within the last three years that I have managed to be able to apply it to my own satisfaction. The burning of shavings, coarse brown paper, or rags, at the mouth of the drain or pipe I often found to be unsatisfactory in certain states of the atmosphere, while the heat of the burning materials caused the current sometimes to come the opposite way to that wanted. This caused me in 1877 to see about getting a smoke-producing machine which would blow smoke into the drain, and with this machine, and by using dirty oily waste, and sulphur, I have been able to test the whole drains in a large house often from one point. Sometimes a few minutes suffice for testing, at other times hours will be required, and the drains or pipes taken in sections, just according to circumstances, and the size and quantity of pipes, etc.

21, Renfrew Street, Glasgow. W. P. BUCHAN.

'SUNDAY OUT.'

At page 343 we read that servants on their 'Sunday out' are often liable to contract disease at the houses they visit. This supports an idea that I have been advocating for some time back myself, viz., that the servants' water-closet should—in large houses where there are several water-closets—debouch into the drain, and be trapped off by itself, and so that nothing from it could get into the other soil-pipes. My reason for this was the fear that the servants might be ill, or bring disease into the house without the master or mistress knowing it in time.

W. P. BUCHAN.

SANITARY JOTTINGS.

Dr. G. R. Barnes, Medical Officer of the Ewell district of the Epsom Union, has been awarded a gratuity of £10 10s. for extra services consequent on the recent fever epidemic at Ewell.——The vital statistics of New South Wales for the past year show an increase in the population of nearly 40,000, which is unprecedented even in the best days of gold digging. The total of the population of the colony is now nearly 750,000.——The annual report of the Borough Surveyor of Birmingham (Mr. W. S. Till), which has just been issued, shows that during last year the length of sewers constructed by the Council was 6 miles, 5 furlongs, 21 yards, and that the length of sewers laid in public streets was 3 miles and 110 yards.——At a recent meeting of the Board of Guardians, Mr. White called attention to the heavy infant mortality of the district during the past year, as shown by the report of Dr. Saunders, Medical Officer of Health. At Tring, the death-rate among infants under one year old was as high as 140 per thousand, the lowest rates being Hendon 92, and Welwyn 75. It was decided to refer the matter to Dr. Saunders for further report, and with a view to drawing public attention to it.——Dr. Schroder, according to the *Pharmaceutical Journal*, after investigating the effect of the smoke and fumes of chemical and metallurgical works, has arrived at the following conclusions:—The deleterious action of these fumes depends upon the acid gases, especially sulphurous and hydrochloric acids; the former turns the whole surface of the leaves brown, while the latter appears to principally attack the edges. Annual crops are less affected than trees; the walnut tree is the most sensitive; then follow the red beech, birch, lime, poplar, alder, ash and plane.——The King's Norton Rural Sanitary Authority has been acting somewhat *ultra vires* in issuing a notice, which in effect calls upon occupiers to cause their house drains to be connected with the sewers by one particular contractor whom the Authority has employed. The Public Health Act gives to owners a statutory right to make their own connections; and inasmuch as complaints have been made of the fashion in which the work has been done by this contractor, there seems especial reason for the Authority being cautious in the notices they give.

SANITARY INVENTIONS.

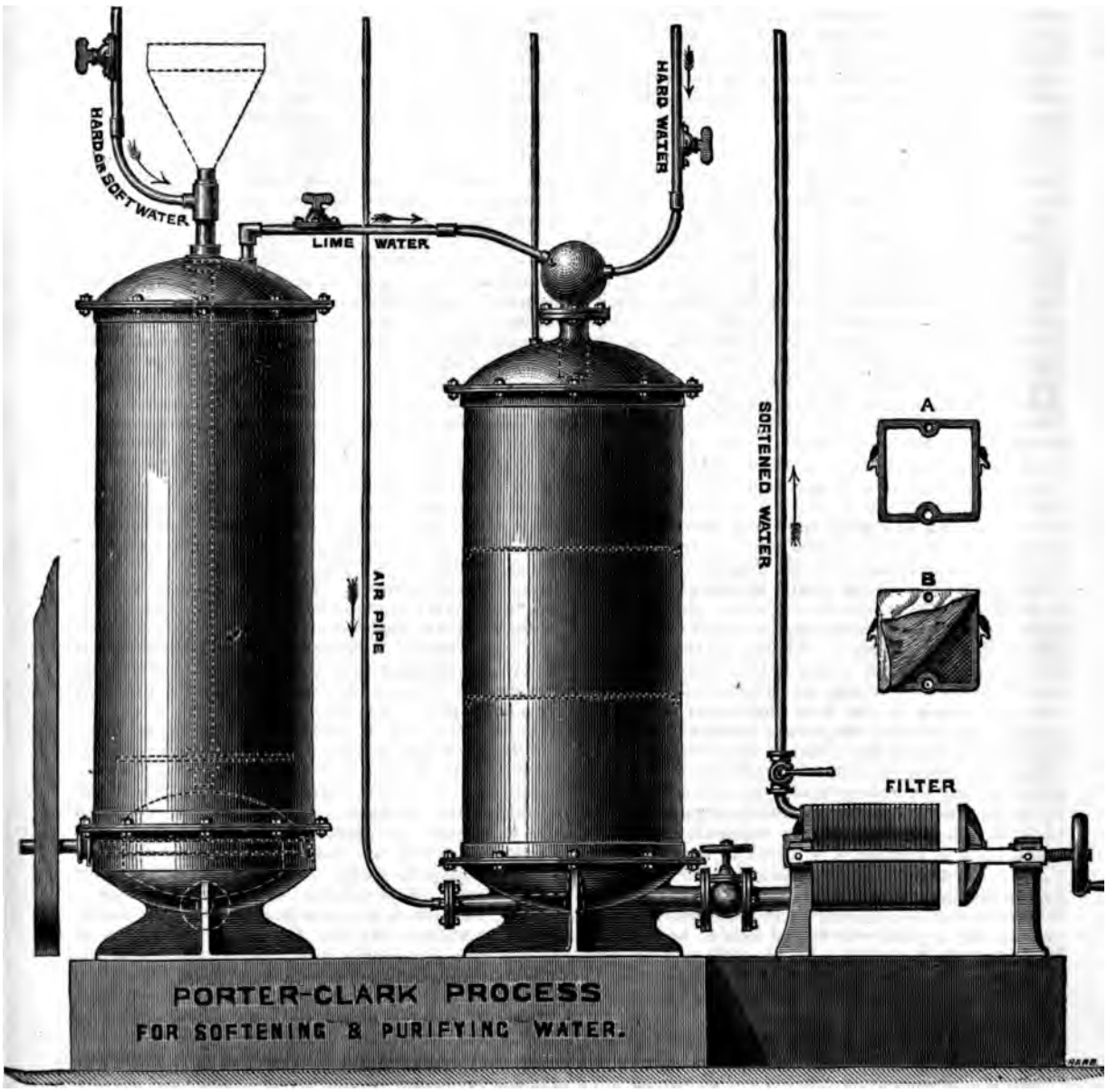
THE PORTER-CLARK PROCESS FOR THE SOFTENING, PURIFICATION, AND FILTRATION OF HARD WATERS.

DR. TIDY, in his report on the quantity and quality of the water supplied to London during 1879 (SANITARY RECORD, March 15, p. 351) says:—'All the water except about one-nineteenth of the total quantity, viz., that supplied by the Kent Water Company, is filtered before delivery, and no less than eighty-two acres of ground are covered by filter-beds for the efficient (?) filtration of the water.' The quantity of water supplied daily in the metropolitan area by the eight water companies averages, according to Dr. Tidy, 32.7 gallons per head for upwards of 4,000,000 of people. It may be assumed that 4,000,000 × 33 gallons = 132,000,000 gallons, one-nineteenth of which quantity (coming from the deep wells in the chalk, and so free from organic impurities) is not filtered; leaving say 125 millions of gallons of water as the quantity for the filtration of which eighty-two acres of ground are appropriated. Eighty-two acres of ground, in the neighbourhood too of London, represent a considerable sum of money, and the spreading, the periodical removal, and the more or less efficient cleansing of the sand and other materials by which it is hoped the impurities of the river water will be arrested, over that large area, involve a standing charge which goes some way to account for the considerable price of water.

The Porter-Clark system not only filters perfectly, has its filtering medium of pure carbonate of lime, and the arrested impurities removed daily, removes those calcareous properties of the water with which all Londoners are but too well acquainted; but does all this within so small a compass that, instead of eighty-two acres, one-tenth of that area would suffice for efficiently treating by this method the 125 millions of gallons in question. This estimate is derived from actual working of considerable quantities; as, for example, more than one-third of a million gallons treated daily for the London and North-Western Railway Company within an area of 40 feet × 25 feet; a similar quantity at Swindon Water Works within nearly the same space. Other

important instances of its application have already been noticed in these columns. The cost of treating large quantities of water diminishes in an inverse ratio with the quantity; for the mechanical appliances reduce the amount of labour very greatly, as scope is afforded for their development. Hence, upon the scale of operations involved in the treatment of 125 millions of gallons, the cost would be reduced to one-third or one-fourth of a penny per thousand gallons, from the one penny or more per thousand gallons, which is all that the process costs upon the scale to which it is at present extended. Considering that the householder of London pays, for very hard water not perfectly filtered, fully two shillings per thousand gallons, the working expense of even one penny per thousand gallons will hardly appear to the consumer as a sum to be cavilled at. With reference to the fact that one-nineteenth portion of the London water supply which, from the purity of its source, deep in the chalk, needs no filtration, and is not filtered, it would be improved for all purposes by being deprived by the Porter-Clark process of the greater part of the lime it holds in solution as a bi-carbonate. Last January Professor Tyndall, at the Royal Institution, explained to those who attended his lectures the advantages experienced at Canterbury (which has, naturally, a similar water supply to that furnished by the Kent Water Company to a portion of the metropolitan area), by the treatment of the water by the process patented so long since by the late Professor Clark, but which remained so long dormant until the mechanical arrangements embraced in Mr. Porter's patents of 1876 and 1879 led to its more general adoption.

Working automatically, under the head of pressure



from the supply cistern of the house or factory, or from the 'main' of the town supply, the Porter-Clark apparatus may stand in any convenient place in the basement of a house, and the softened and filtered water circulating through it may be thence led upwards, if desired, to any convenient receptacle in an upper room—short of the level of the original source of supply. With an ordinary ball-valve fitted to the pipe leading from the filter and discharging into such receptacle, the action of the apparatus is continuous or intermittent according as the water is withdrawn. The apparatus is easily connected or disconnected with the ordinary service-pipes, requires no special foundation or fixing, and can be removed, as a piece of household furniture, from one residence to another.

In the annexed illustration, which represents an apparatus for softening 300 gallons per hour, the taller of the two vessels is that in which lime-water is prepared, and the shorter is that in which a due proportion of the lime-water is mixed with the hard water to be softened, and in which vessel, in fact, the actual softening is effected before the water, rendered chalky by the operation, passes to the filter in which the chalk is arrested, together with such other impurities as the water may have in suspension. By the temporary use of a funnel, a quantity of *newly-burnt* lime, slaked in the ordinary way, and screened from cinder and imperfectly-burnt stone, and mixed into a thick cream, is introduced through the central pipe into the lime-water vessel, and the pipe is then closed by a screw plug. The water is then admitted by the branch pipe into that by which the lime was introduced, and issuing at the bottom among the lime, becomes 'saturated' therewith; for the capacity of the vessel is so proportioned to the rate at which the lime-water is withdrawn by the small pipe at the top, that there is ample time allowed not only for the saturation of the water with lime, but for the excess of lime in suspension to be gradually precipitated from the ascending water, which thus becomes clear at the top of the vessel ere it passes over by the small pipe by which it is led to the second or mixing vessel. Passing over by the small pipe, the clear lime-water enters the globular 'receiver' above the second or 'mixing vessel', and there encounters and becomes forcibly intermingled with the larger volume of the hard water, and they pass together downwards, striking upon and being broken up and dispersed by a diaphragm plate introduced where the cover is bolted to the top of the vessel, and which has orifices only at its circumference. Passing by these orifices into the compartment beneath, the several streams are compelled to converge in order to escape by one central opening in the next diaphragm to a third compartment, whence the stream is again subdivided as before, to repeat the process; the chemical action meanwhile going on actively, and the waters that entered clear becoming 'milky' by the crystallising out of the lime of both into infinitely minute particles of chalk, whereby the water is softened. Upon the larger scale of working it is useful to employ a very slight amount of mechanical agitation in both vessels, as, for example, is indicated in the woodcut by the horizontal shaft at the base of the lime-water vessel, and having a pulley-wheel and belt to be actuated by machinery in motion. An example of this upon a large scale is at Liverpool, where the vessels for softening 15,000 gallons of water per hour are 30 feet in length and 7 feet in diameter.

From the 'mixing vessel', the milky or chalky water passes on to the filter, entering its several alternate compartments, whence it can escape only by filtration through the constantly-increasing deposit of carbonate of lime (to which it contributes its proportion) coating a series of cloths of suitable texture. The cloths, disposed as towels upon a towel-horse, and separated by the space of three-quarters of an inch, are compressed tightly between the frames, A, and plates, B, by the powerful end screw, so that the holes seen in their upper and lower edges become two channels or pipes, the chalky water entering from the lower channel into the frames, A, and the filtered water issuing from the grooved surface of the plates, B, into the upper channel, and so outwards by the pipe marked 'softened water' in the wood-cut. When the screw is relaxed, and the plates and frames parted by an inch or two, the cloths with their adherent chalk and impurities are lifted off, thrown into a pail and rinsed, and replaced in the filter. When working upon a large scale, a change of cloths is at once substituted for the others, and the operation of filtering put in action again with only a few minutes' delay. It will be understood that this removal of the cloth, with the very filtering medium of pure carbonate of lime, and all the impurities that it so effectually intercepts, puts out of question any contamination of the water by the means employed for filtration, as is the case in the common house filters. In these latter, as is well known, the filtering materials remain unchanged for months and years, absorbing and accumulating ever-increasing deposits of decomposing impurities. This is an evil effectually got rid of by the Porter-Clark system, together with the calcareous mineral properties, which not only occasion great discomfort and waste, but are considered by many physicians to be the origin of painful maladies in some constitutions, and to have prejudicial effects with many others. For the more effectual *purification* of the water, as well as to aerate and to promote by agitation the chemical action of the lime-water, there is sometimes connected with the hard-water descending pipe a branch pipe by which the descending water draws in air; water and air passing downwards in separate volumes into a small vessel (an ordinary ball cistern of the smallest dimensions, fitted with an air-tight cover serves very well), in the upper part of which the air accumulates and is led away by one pipe, while the water continues its descent by another to the globular head upon the mixing vessel. The air, on the contrary, is led to the very bottom of the mixing vessel, and being constantly under pressure from above, is forced into and ascends through the several chambers of this vessel, meeting and baffling in their course the descending streams of chalky water, and escaping by a small pipe at the top.

It is desirable, it should be understood, that the form in which lime is used in this process is just that in which it is administered to very young children and others, to counteract any acidity of the stomach. So that, were there much risk of more of this clear lime-water than is just necessary to soften the hard water passing into the mixing vessel, it would be perfectly harmless for dietetic use—indeed it might be argued as of benefit (seeing how much it is the fashion to drink potash and soda waters), but that the proportioned orifices of the two jets hardly admit of so much excess; rather, unless the lime-water is kept up to the desired degree of alkalinity, is there the risk of the hard water not being softened to the fullest extent possible. All the lime that water can hold in solution is but nine oz. in forty gallons, and if we assume that forty gallons of such 'saturated' lime-water brought

into mixture with 360 gallons of the hard water is necessary for softening that quantity, and so *is changed by the carbonic acid of the hard water into insoluble chalk*, it will be seen that if one-fourth more were added (that is, ten gallons beyond the forty), we should have only two ozs. and a quarter of lime dissolved in the whole 410 gallons of softened water. And it is only by using a *clear* solution of lime that it is possible to work with any accuracy. The strength of this is easily tested, by means requiring no special skill. Lime itself—or what is obtainable as lime—is more or less imperfectly burnt stone, with varying proportions of earthy and other matters. It is impossible to expel, in the lime kiln, *all* the carbonic acid that constitutes the difference between lime and chalk (carbonate of lime); therefore, a bushel of 'lime' is not wholly a bushel of *lime;* nor will one bushel have the same proportion of caustic lime as another. Again, exposure to the air quickly destroys the causticity of a portion. But, as the maximum quantity that water will hold in solution is known, and is very small, it is desirable to have a very large excess of lime wherewith to 'saturate' it within a convenient time to the maximum degree; therefore, the large quantity of cream of lime kept stored in the bottom of the lime-water vessel. The many inconveniences resulting from the use of hard waters, and the advantages of soft water in the household, for culinary purposes, for the kitchen boiler, for the greenhouse and conservatory, and for the stable, are too well known to need enlarging on. For brewing, this process removes only the lime and magnesia in combination with carbonic acid, and which, being also removable by boiling the water for thirty or forty minutes, constitute what is called the 'temporary hardness' of water, in contradistinction to the lime and magnesia in combination with sulphuric (and some other) acid which, remaining unaffected by the boiling, is called 'permanent' hardness. It is this latter—and not at all the former quality—that gives the paleness and 'tone' to the Burton and other ales, and which some brewers, in districts (as Brighton for example) where the water has much 'temporary' and hardly any 'permanent' hardness, endeavour to obtain by placing lumps of gypsum (sulphate of lime) in their water tanks. Where, as in laundry work, the permanent hardness is objectionable, it may be removed by the use of other, but more costly agents—carbonate of soda being that in common use; but this could be more economically employed through the Porter-Clark apparatus than, by 'the rule of thumb', at the washing tub.

SOPER'S HOSPITAL DRAIN AND PORTABLE DISINFECTORS.

In these disinfectors, chlorine gas, one of the most effective and energetic of disinfectants, is evolved in a greater or smaller quantity, and at a very small cost. This gas decomposes the sulphuretted hydrogen and sulphide of ammonium, of which the fœtid effluvia of sewage largely consist, acting not only on the foul liquid itself, but also on all free fœtid gases. The disinfector is charged with a mixture of black oxide of manganese, chloride of sodium, and dilute sulphuric acid in proper proportions, and can, where required, evolve chlorine gas continuously, even for five or six days. When a rapid and free production of the gas is wished for, chloride of lime and dilute sulphuric acid, or powdered chlorate of potash and strong hydrochloric acid, may be used. In order to obtain uniformity of action with each sized disinfector are supplied two measures, one to contain the mixture of black oxide of manganese and common salt (equal parts), and the other to contain the acid, composed of an equal measure of commercial sulphuric acid and water. It is better, however, that the diluted acid should be purchased ready mixed; if not, the acid must be gradually and slowly added to the water in an earthenware vessel.

The portable disinfector is made in several sizes, for use in rooms, latrines, cesspits, manure heaps, or putrescent fluids; and it may be used to disinfect ambulances, mortuaries, etc. If suspended over a manure pit, it will chemically destroy the offensive ammoniacal odour. It may be suspended in urinals at railway stations, theatres, etc., and is used in the wards and latrines of some of our largest infirmaries and infectious hospitals, and in this form gives off a largely diluted atmosphere of chlorine not offensive to the most delicate cases.

The drain 'disinfector has the special advantage of directly attacking infective disease germs in the drains, both in the liquid contents and in the gases in the upper level; the excreta, therefore (whether from hospitals or private dwellings) are effectually disinfected, and diseases such as typhoid fever, diphtheria, dysentery, cholera, and diarrhœa (so often the result of sewage contamination), are thereby almost entirely prevented. This disinfector is in successful operation at the Stockwell Hospitals (fever and small-pox), at Guy's Hospital, Lambeth Infirmary and Workhouse, etc.; and it has been employed with great success in destroying the offensive emanations from sewer gratings and gully holes, as also the foul air of ventilating shafts in connection with the sewers and filth hoists. Many testimonials from practical judges, such as medical officers of health, superintendents of hospitals, and ship surgeons, bear witness to the value of Mr. Soper's excellent invention.

DUTIES OF MEDICAL OFFICERS OF HEALTH.

(*See Page* 380.)

[By orders of the Local Government Board, dated respectively the 8th, 9th, 11th, and 12th ult., the following duties are imposed upon all medical officers of health who may be appointed or reappointed by any Sanitary Authority after the 25th of March 1880, whether any portion of their salaries is repaid out of moneys voted by Parliament or not. Those whose salaries are partly repaid by Government will not be required to send notice of their appointment to Whitehall, as this will be done by the Sanitary Authority. The variations between these duties and those laid down in the previous orders on the same subject of the 11th of November 1872, are shown in italics.]

1. *He shall, within seven days after his appointment, report the same in writing to the Local Government Board.*

2. He shall inform himself as far as practicable respecting all influences affecting or threatening to affect injuriously the public health within the district.

3. He shall inquire into and ascertain by such means as are at his disposal he causes, origin, and distribution of diseases within the district, and ascertain to what extent the same have depended on conditions capable of removal or mitigation.

4. He shall, by inspection of the district, both systematically at certain periods, and at intervals as occasion may require, keep himself informed of the conditions injurious to health existing therein.

5. He shall be prepared to advise the Sanitary Authority on all matters affecting the health of the district, and on all sanitary points involved in the action of the Sanitary Authority; and, in cases requiring it, he shall certify, for the guidance of the Sanitary Authority or of the Justices, as to any matter in respect of which the certificate of a medical officer of health or a medical practitioner is required as the basis or in aid of sanitary action.

6. He shall advise the Sanitary Authority on any question relating to health involved in the framing and subsequent working of such bye-laws and regulations as they may have power to make.

7. On receiving information of the outbreak of any contagious, infectious, or epidemic disease of a dangerous character within the district, he shall visit the spot without delay, and inquire into the causes and circumstances of such outbreak, and *in case he is not*

satisfied that all due precautions are being taken, he shall advise the persons competent to act as to the measures which may appear to him to be required to prevent the extension of the disease, and, so far as he may be lawfully authorised, assist in the execution of the same.

8. *Subject to the instructions of the Sanitary Authority, he shall direct or superintend the work of the inspector of nuisances in the way and to the extent that the Sanitary Authority shall approve*, and, on receiving information from the inspector of nuisances that his intervention is required in consequence of the existence of any nuisance injurious to health, or of any overcrowding in a house, he shall, as early as practicable, take such steps authorised by The Public Health Act, 1875, in that behalf, as the circumstances of the case may justify and require.

9. In any case in which it may appear to him to be necessary or advisable, or in which he shall be so directed by the Sanitary Authority, he shall himself inspect and examine any animal, carcase, meat, poultry, game, flesh, fish, fruit, vegetables, corn, bread, flour, *or milk*, exposed for sale, or deposited for the purpose of sale or of preparation for sale, and intended for the food of man, which is deemed to be diseased, or unsound, or unwholesome, or unfit for the food of man; and if he finds that such animal or article is diseased or unsound, or unwholesome, or unfit for the food of man, he shall give such directions as may be necessary for causing the same to be seized, taken, and carried away, in order to be dealt with by a Justice according to the provisions of the Statutes applicable to the case.

10. He shall perform all the duties imposed upon him by any bye-laws and regulations of the Sanitary Authority, duly confirmed, in respect of any matter affecting the public health, and touching which they are authorised to frame bye-laws and regulations.

11. He shall inquire into any offensive process of trade carried on within the district, and report on the appropriate means for the prevention of any nuisance or injury to health therefrom.

12. He shall attend at the office of the Sanitary Authority or at some other appointed place, at such stated times as they may direct.

13. He shall from time to time report in writing to the Sanitary Authority, his proceedings, and the measures which may require to be adopted for the improvement or protection of the public health in the district. He shall in like manner report with respect to the sickness and mortality within the district, so far as he has been enabled to ascertain the same.

14. He shall keep a book or books, to be provided by the Sanitary Authority, in which he shall make an entry of his visits, and notes of his observations and instructions thereon, and also the date and nature of applications made to him, the date and result of the action taken thereon, and of any action taken on previous reports; and shall produce such book or books, whenever required, to the Sanitary Authority.

15. He shall also prepare an annual report, to be made to the end of December in each year, comprising a summary of the action taken during the year for preventing the spread of disease, *and an account of the sanitary state of his district generally at the end of the year*. The report shall also contain *an account of the inquiries which he has made as to conditions injurious to health existing in his district*, and of the proceedings in which he has taken part or advised under The Public Health Act, 1875, so far as such proceedings relate to those conditions; and also an account of the supervision exercised by him, or on his advice, for sanitary purposes, over places and houses that the Sanitary Authority have power to regulate, with the nature and results of any proceedings which may have been so required and taken in respect of the same during the year. It shall also record the action taken by him, or on his advice, during the year, in regard to offensive trades, and to factories and workshops. The report shall also contain tabular statements (on forms to be supplied by the Local Government Board, or to the like effect) of the sickness and mortality within the district, classified according to diseases, ages, and localities.

16. He shall give immediate information to the Local Government Board of any outbreak of dangerous epidemic disease within the district, and shall transmit to the Board a copy of each annual and of any special report.

17. In matters not specifically provided for in this Order, he shall observe and execute the instructions of the Local Government Board on the duties of medical officers of health, and all the lawful orders and directions of the Sanitary Authority applicable to his office.

18. Whenever the Local Government Board shall make regulations for all or any of the purposes specified in Section 134 of the Public Health Act, 1875, and shall declare the regulations so made to be in force within any area comprising the whole or any part of the district, he shall observe such regulations, so far as the same relate to or concern his office.

NOTICES OF MEETINGS.

CONFERENCE ON PUBLIC HEALTH.

In consequence of the general election, it has been considered advisable to fix the date for the Conference on this subject in the beginning of June. The Right Hon. James Stansfeld, M.P., late President of the Local Government Board, will be in the chair. A programme of subjects for discussion has been drawn up by the Executive Committee, and will be submitted to the Conference. The following are the subjects included:—1. The development of Local Government administration, especially by the constitution of County Boards. 2. The extension of the powers of the local authorities of urban and rural sanitary districts. Amendments in the Public Health Act. 3. Sanitary inspection and classification of dwellings. 4. Amendments in the Rivers Pollution Prevention Act. 5. The advisability of strengthening the administrative organisation of the Local Government Board. Local Government Board Administration Areas. 6. Further suggestions by sanitary authorities. The detailed programme will be issued shortly, and copies can be obtained, when ready, from the Secretary of the Society of Arts, by any person who applies. The programme will also be issued to sanitary authorities throughout the kingdom. It is not proposed to make any attempt to procure papers which may be read and discussed; but the Committee will be glad to receive any communications containing fresh information, or giving accounts of progress made since the last Conference. Such communications, if approved by the Committee, will be printed and circulated at the Conference, but it is probable that time will not admit of any discussion being taken upon them.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

The next meeting will be held at 1, Adam Street, Adelphi, on Friday, 16th April, at 7.30 p.m., when the following papers will be read:—'The prevention and propagation of Diphtheria', by M. A. Wynter Blyth; 'Diphtheria and Typhoid, and their concomitant conditions in Birmingham', by Dr. Alfred Hill.

ERRATUM.

In Note of the Month, 'Sanitary Matters at Goole', page 342, March 15, 1880, read, Mr. E. C. Buchanan Tudor, '*Town* Surveyor, etc.', instead of Mr. E. C. Buchanan Tudor *Timms*, Surveyor, etc.

THE PUBLIC HEALTH ACT.—Frederick Abner Gange, M.D. Univ. St. And., M.R.C.S. Eng., L.S.A. Lond., has been appointed medical officer of health for the Faversham Rural Sanitary District, Kent, at £150 per annum, vice the Poor-Law District Medical Officers, whose appointments have expired; Thomas Charles Langdon, F.R.C.S. Eng., L.S.A. Lond., has been re-appointed medical officer of health for the Winchester Urban Sanitary District, for five years; Francis Craddock Palmer, L.K.Q.C.P. Irel., M.R.C.S. Eng., L.S.A. Lond., has been appointed medical officer of health for the Brigg Urban Sanitary District, Lincolnshire, vice Paterson, resigned.

The Goole Local Board have again taken up the question of providing the town with good water-supply; and Mr. Bartholomew, C.E., of Leeds, has recently had an interview with the Board on behalf of the navigation. The Board have also instructed their Town Surveyor, Mr. E. C. Buchanan Tudor, who has had considerable experience in this tidal district, to prepare a complete scheme of drainage for the north side of Goole. The scheme is completed and approved, and will shortly be forwarded to the Local Government Board.

ORIGINAL PAPERS.

TRICHINOSIS;

AND THE DANGERS ARISING FROM THE CONSUMPTION OF FLESH FOOD.*

By T. SPENCER COBBOLD, M.D., F.R.S., F.L.S.,
President of the Quekett Microscopical Club.

WHAT to eat, what to drink, and what to avoid, are questions which daily arise in the household, and which, thanks to the right of private judgment, receive practical answers almost as varied as the characters of the individuals who either mentally or verbally utter them. This consideration should of itself suffice to check the undue enthusiasm of specialists. As regards the drink question, if any person, gifted in intellect, persuasive in manner, powerful in utterance, and fortified by years of scientific research, has come to imagine that he can authoritatively lay down rules of guidance that will receive universal acceptance, he greatly deceives himself. However vital its importance, no general conclusion deduced from science will ever command unanimous approval. It not unfrequently happens that those discoveries which in their legitimate practical applications are destined to achieve the most brilliant results, are just the very ones that encounter the greatest hostility. Look at the discovery of Jenner. To be sure, the opposition to compulsory vaccination is not altogether unreasonable. If by sheer carelessness, or by the want of proper precautions, a simple operation which should act as a blessing, prophylactically, becomes the medium of a virulent poison, who can be surprised that the entire process, as enforced by law, should be viewed as little short of an outrage? If anger there must needs be, let the displeasure fall on those who, through an imperfect knowledge of their duties, have brought the beneficent act of the legislature into disrepute. Certainly, from the scientific standpoint, the grandeur of the discovery of the immortal Jenner remains unaffected.

I have prefixed this illustration as a suitable apology, alike for my method and line of argument. I hold that the public have been seriously misled respecting the question of the dangers arising from the consumption of animal food, and that deceptions, altogether unintentional, have arisen from the absence of that needful measure of instruction which should have been conveyed to officials previous to their appointment as inspectors, officers of health, and so forth. It is not, however, the individual that should be blamed, but the system which creates inefficient officers. There is probably no official who does not conscientiously do his best for the public good; nevertheless, to show how much need there is of practical instruction, I may mention that for many years past I have been in the habit of receiving letters, not only from various parts of the United Kingdom, but also from India and our colonies, requesting information respecting the parasites that are either known or surmised to be connected with the production of diseased or deteriorated conditions of the flesh of animals consumed as food. Added to all this, it must be borne in mind that it is not easy, even for the professedly enlightened, to shake off early prejudices in the matter of the choice of food. Who, for example, would not feel some compunction at feasting off a joint, if, previous to or after the removal of the dish-cover, he were told that the leg or shoulder had been removed from a sheep that had been found lying upon its back in the bottom of a ditch? And yet, if a physiologist were asked whether the flesh of an asphyxiated sheep, destroyed in this way, is really injurious, he would probably answer that, provided no decomposition had set in, the meat was just as good, if not better, than much else that is sold in the market.

It is from the parasitic point of view that we now propose to deal with the meat-food question, and it is just this very aspect of the subject which needs most full and careful treatment, for whilst there are numbers of skilful investigators competent to deal with the chemical processes involved in the deterioration of flesh food, there are very few persons in Europe who have disciplined themselves in a continuous practical effort to master the facts of parasitism.

Everybody has heard of *trichinosis*, and that the malady thus called, in so far as it affects man, is usually derived from the consumption of trichinous pork. Dominated by the far too prevalent and altogether erroneous conception that swine's flesh is the chief source of parasitism in man, a master mind (Professor Huxley), not many years back, wrote thus:—'Of all animals feral and domestic, the common pig is, beyond all doubt, the most fertile source of human entozoa; at least, of important parasites, *trichina spiralis* and the tapeworm would, there is good reason to believe, cease to infest us, did not this favourite quadruped act the part of a communicating medium.' I entirely dispute the truth of this proposition in so far as it refers to the tapeworm. When engaged in actual practice, I estimated that at least 95 per cent. of the cases of tæniæ that came under my notice were derived from the consumption of measle-affected beef, whilst somewhat less than 5 per cent. of the tæniæ were derived from the consumption of pork. This estimate was based upon the zoological characters of the tapeworm species, which, when the segments or proglottides are dried upon glass, usually offer sufficiently distinctive characters. In very many instances the examination of the head of the parasite placed the correctness of the diagnosis beyond the possibility of doubt. In reference to the larvæ, as seen not alone in beef and pork, but even also occasionally in mutton, I shall again have occasion to speak. As regards the trichina, the above-made statement is not far wrong, for although it is possible to rear the fleshworms by experiment in almost all quadrupeds, yet it is obvious that in a state of nature most of our food-yielding animals, by reason of their herbivorous habits, have little opportunity of incurring self-infection. Hogs, on the other hand, possessing omnivorous habits, and consuming as they are wont to do all kinds of garbage, render themselves liable to infection in various ways. They will even eat dead rats, a small percentage of which are known naturally to harbour trichinæ. This circumstance has not unnaturally led some to conjecture that rodents really constitute the original indigenous hosts whence all the trichinæ came. The hypothesis seems to me to rest upon a very insecure basis.

In the history of the discovery of the trichina, and in the record of the gradual manner in which we have obtained our present well-nigh exhaustive knowledge of the structure and development of this little entozoon, the progressive triumphs of biological and sanitary science are well epitomised. There is

* Read before the Sunday Lecture Society, April 4, 1880.

no need to give minute details on this head. The facts are patent. Those who wish for the minutest particulars can consult either the standard work of Leuckart, or the more accessible treatise of Davaine. In the matter of the original discovery of the parasite, in the record of experiments conducted in England, and in the question of the only outbreak of trichinosis that has taken place in this country, I must respectfully refer them to my latest work as well as to the Cantor Lectures for 1871.*

Most of the more important conclusions derived from studies, based upon experimental research, have been admirably summed up by Professor Leuckart as follows:—'1. *Trichina spiralis* is the juvenile state of a little round worm, previously unknown, to which the generic title of trichina must remain attached. 2. The sexually mature trichina inhabits the intestinal canal of numerous warm-blooded animals, especially mammalia (also of man), and constantly in great numbers. The duration of its life extends from four or five weeks. 3. At the second day after their introduction the intestinal trichinæ attain their full sexual maturity. 4. The eggs of the female trichinæ are developed within the uterus of the mother, into minute filaria-like embryos, which, from the sixth day, are born without their egg-coverings. The number of young in each mother-worm is at least from 10,000 to 15,000. 5. The new-born young soon after commence their wandering. They penetrate the walls of the intestine and pass directly through the abdominal cavity into the muscles of their bearers, where, if the conditions are otherwise favourable, they are developed into the form hitherto known. 6. The directions in which they proceed are in the course of the intermuscular connective tissues. 7. Only the striped muscle (that of the heart excepted) contains trichinæ. The majority of the wandering embryos remain in those sheathed muscular groups which are nearest to the cavity of the body, especially in those which are smaller and most supplied with connective tissue. Speaking generally, their number decreases with the distance from the abdomen, being, however, more numerous in the anterior half of the body. 8. The embryos penetrate into the interior of the separate muscular bundles, and here already, after fourteen days, acquire the size and organisation of the well-known *Trichina spiralis*. 9. Soon after the intrusion of the parasite the infested muscular fibre loses its original structure, the fibrillæ collapse into a finely granular substance, whilst the muscular corpuscles change into oval nucleated cells. 10. The infected muscular bundle retains its original sheathing up to the time of the complete development of the young trichinæ, but afterwards its sarcolemma thickens, and begins to shrivel at the extremities. 11. The spot inhabited by the rolled-up parasites is converted into a spindle-shaped widening, and within this space, under the thickened sarcolemma, the formation of the well-known lemon-shaped or globular cysts commences by a peripheric hardening and calcification. This degeneration commences several months after the wandering. Immature muscle-trichinæ are not capable of producing infection. 12. The migration and development of the embryos also take place after the transportation of impregnated trichinæ into the intestines of a new host. 13. The further development of the muscle-trichinæ into adult animals is altogether independent of the formation of the calcareous shell, and occurs as soon as the former have reached their completion. 14. Males and females are already recognisable in their larval state. 15. The immigration of the trichina-brood in masses produces very grave or even fatal consequences, such as peritonitis (from the embryos perforating the intestinal walls), pain, and paralysis (resulting from the destruction of the infected muscular fibres). 16. The infection of man occurs especially through swine. 17. The muscle-trichinæ are so capable of resistance that they are by no means in all cases destroyed by the ordinary methods of roasting, cooking, pickling, and smoking. 18. As a rule, swine obtain trichinæ from rats, to which latter we also as the natural bearers have to convey them. Microscopic examination of flesh is, therefore, urgently recommended as a public preventive against all danger from trichinæ.'

Professor Leuckart, of course, assumes that the microscopic examination would be conducted by persons not only familiar with the appearances presented by trichinæ, but also with the characters presented by other parasites which might readily be mistaken for flesh-worms.

In regard to the alleged recent outbreak of trichinosis on board the school-ship *Cornwall*, I confess that I am sceptical as to its genuineness. I do not, of course, doubt for a moment that parasites of some kind or other have been seen, but I must beg to differ entirely as regards the inferences that were drawn from the facts observed. I think it a pity, also, that so long an interval as three months was allowed to elapse without the issue of any full report.* Those who have accepted the trichinosis-view of the outbreak without reservation have, I think, caused undue alarm by assuming (as Mr. Fleming, for example, has done) that the trichinæ which infected the boys 'must have retained their vitality in spite of prolonged boiling'. Cooking of the American pork, we were told, 'did not protect the boys from trichinosis.

Before entering upon the all-important question of temperature, I must first of all remark that in two out of three previously reported outbreaks of trichinosis in England, actual proof of the presence of parasites was wanting. In one of these the members of a large family had symptoms remarkably like those of trichinosis. At the request and advice of an eminent London surgeon, Mr. Gay, F.R.C.S., one of the lads permitted the removal of a small portion of muscle from his leg by operation. I examined this vivisectioned fragment with the microscope. Not a trace of trichinæ existed. The other alleged outbreak to which I allude was that reported by Dr. Armistead from Thaxted, in Essex (SANITARY RECORD, old series, June 27, 1879, p. 409). In this instance forty-four persons had symptoms of irritant poisoning from eating sausages. Again the severe sickness was assumed to be due to the consumption of American pork; and, yet, as a matter of fact, not a particle of evidence affording proof of the existence of trichinæ was produced. To be sure, the treatment was directed towards killing the worms, and yet no worms had ever been seen. The poisoning was probably due to botalismus.

* *Parasites*; a treatise on the entozoa of man and animals. J. and A. Churchill, 1879.—'Our food-producing ruminants and the parasites which reside in them. Cantor Lectures, *Journ. Soc. Arts*, 1871.

* Since the delivery of this lecture copies of the Report have been circulated. After careful perusal of the very able articles that have appeared in the *British Medical Journal* and in the *Lancet*, I must, with all due deference to the learned writers, respectfully state my belief that the parasites seen by Mr. Power and his coadjutors were not trichinæ properly so-called.—T. S. C.

I must now enter upon the most important phase of the question at issue. According to the parliamentary reports, Lord Thurlow 'expressed some doubt as to whether ordinary cooking would destroy trichinæ'. Let us endeavour to set this matter at rest. It will save time, however, and there will be no irrelevancy, if, whilst adducing proofs in connection with the question of the temperature necessary to destroy trichinæ, we, at the same time, deal with the equally important question as to what amount of cooking will kill *cysticerci* or the larvæ of tapeworms. These young tapeworm-parasites are much more common in the flesh of animals than trichinæ.

Of the several investigators who have dealt practically with this question, I think we may accord to Professors Pellizzari and Perroncito, and to Dr. Lewis, the first rank. The labours of Dr. Thudichum will be alluded to subsequently. The Italian experimenters, it is true, have placed their results somewhat in antagonism, but taking the research as a whole, they are very complete.

Dr. Lewis, whose experiments exclusively refer to the measles of beef and pork, remarks '1. That exposure to a temperature of 120° Fahr. for five minutes will not destroy life in cysticerci, and they may continue to manifest indications of life for at least two or three days after such exposure; 2. That exposure to a temperature of 125° Fahr. for five minutes does not kill them; but, 3, after being subjected to a temperature of 130° Fahr. for five minutes, they may be considered to have perished. After exposure to this and higher temperatures, in no instance have I been able (he adds) to satisfy myself that the slightest movements took place in their substance when examined even under a high power. At least, it may be confidently asserted that, after exposure for five minutes to a temperature of 135° to 140° Fahr., life in these parasites may be considered as absolutely extinct.'

Dr. Lewis is known as an investigator possessing unusual powers of observation; nevertheless, in the matter before us, I believe the researches of Pellizzari and Perroncito have been conducted, if not with more care, at all events upon a much more extended scale. Even these gentlemen appear to have been misled by their earlier experiments. Thus, a few years back, Professor Perroncito said: 'I introduced some little slices of muscle-flesh infested with cysticerci into a vessel containing fat at the temperature of 190° to 200 Cent. (374 to 400 Fahr.)' and yet he adds, 'the cysticerci were well preserved.' Further, he was led to say: 'If it is not certain that the cysticerci die at from 80 to 100 Centigrade (176 to 212 Fahr.), we are quite sure that they dry up and become completely mummified at 125, 130, and 150 Cent. (=257, 268, and 302° Fahr.')

These statements drew Professor Pelizzari into the field. He instituted a series of experiments, the results leading him to criticise somewhat severely the conclusions of Perroncito. In these researches he was ably assisted by Dr. Tommasi, to whom, indeed, I stand indebted for placing my smaller works on parasites before the Italian public.

Professor Pelizzari found that cysticerci, so far from requiring a temperature of upwards of 100° Centigrade for their destruction, die at a temperature of 60° Centigrade (140° Fahr.). He had, it appears, previously taken the initiative in recommending certain measures to the Florentine municipality, in view of protecting the public health, and he had now the satisfaction of more than confirming the wisdom of these sanitary precautions. In excessively measled animals the fat is removed and boiled in suitable cauldrons, and has potash mixed with it to render it useful for industrial purposes. By the measures adopted the entire animal is utilised.

Professor Pellizzari having (in the course of a communication to the Medico-Physical Academy at Florence) remarked that his colleagues' propositions were of no value whatever, Dr. Perroncito returned to the subject, and by a new series of experiments, conducted with extreme care, finally ascertained that the cysticerci perished at a much lower temperature than even Pelizzari had stated; namely, at 50° Cent. (=122 Fahr). In May 1877, Professor Perroncito himself kindly furnished me with an account of his researches, which, after a few verbal alterations, were recorded as follows:

'In order,' says Professor Perroncito 'to resolve the highly important question of the tenacity of life of the Helminths and corresponding larval forms, I made since 1871 a very long series of experiments on the *Cysticercus cellulosæ*, which were published almost at the same time with others of the same kind, made by Dr. Lewis in Calcutta. Towards the end of 1874, Mr. Pellizzari of Florence disputed the results of the investigations which I had made known two years before, *i.e.*, in 1872, and agreed with Dr. Lewis, who had stated already that the cysticercus exposed to a temperature of 55° Cent. can be held for dead after five minutes, and also with Dr. Cobbold, who thought the temperature of 60° Cent. quite enough to kill it. But the characters he (Mr. Pelizzari) relied upon, needing the exactness and precision required to enlighten and persuade in the most important scientific questions, gave rise to a mistrust in the most scrupulous amongst the men devoted to biological pursuits, and to doubt respecting the value of the several hygienic measures adopted on the part of the sanitary inspectors with regard to infected pork. Therefore, my conclusions, argued from the experiments made in 1871-72, were still those followed by the most prominent Italian cities, and approved in principle by the superior Board of Health in 1873. I expressed doubt then about the cysticercus dying at a temperature lower than 100° Cent., and some person misconstrued these doubts, saying that I had contradicted myself in my work. However, as I could not assert they died at 80°—100° Cent., I only noticed the alteration of colour and cohesion which happened in the cysticercus exposed to various degrees of temperature, to the end that I might contribute usefully to the solution of the difficult question, and concluded that "if we could not be sure of the cysticercus dying at 80°—100 Cent., it was certain at all events that they perished at 125 or 130° Cent. Not wishing to prejudice the question, I never said that they did not die at 80°—100° Cent., but simply stated that at this temperature we could not be certain of their death. Now, after a large number of fresh experiments, I have been able to ascertain with exactness the lowest degree of temperature required to kill infallibly the cysticercus and other parasites of animals.'

Of course, Perroncito's experiments included the trichinæ, and on this part of the question his statements are brief, clear, and emphatic. He says: 'The *Trichina spiralis*, both free and in a cyst, always died at 40.8° Cent.' Finally, he says:

'Each experiment lasted about ten minutes, and the temperature rose from 8-10° C. to 45-46 C. in six to eight minutes; and from 46° to 50° in one minute.

no need to give minute details on this head. The facts are patent. Those who wish for the minutest particulars can consult either the standard work of Leuckart, or the more accessible treatise of Davaine. In the matter of the original discovery of the parasite, in the record of experiments conducted in England, and in the question of the only outbreak of trichinosis that has taken place in this country, I must respectfully refer them to my latest work as well as to the Cantor Lectures for 1871.*

Most of the more important conclusions derived from studies, based upon experimental research, have been admirably summed up by Professor Leuckart as follows:—'1. *Trichina spiralis* is the juvenile state of a little round worm, previously unknown, to which the generic title of trichina must remain attached. 2. The sexually mature trichina inhabits the intestinal canal of numerous warm-blooded animals, especially mammalia (also of man), and constantly in great numbers. The duration of its life extends from four or five weeks. 3. At the second day after their introduction the intestinal trichinæ attain their full sexual maturity. 4. The eggs of the female trichinæ are developed within the uterus of the mother, into minute filaria-like embryos, which, from the sixth day, are born without their egg-coverings. The number of young in each mother-worm is at least from 10,000 to 15,000. 5. The new-born young soon after commence their wandering. They penetrate the walls of the intestine and pass directly through the abdominal cavity into the muscles of their bearers, where, if the conditions are otherwise favourable, they are developed into the form hitherto known. 6. The directions in which they proceed are in the course of the intermuscular connective tissues. 7. Only the striped muscle (that of the heart excepted) contains trichinæ. The majority of the wandering embryos remain in those sheathed muscular groups which are nearest to the cavity of the body, especially in those which are smaller and most supplied with connective tissue. Speaking generally, their number decreases with the distance from the abdomen, being, however, more numerous in the anterior half of the body. 8. The embryos penetrate into the interior of the separate muscular bundles, and here already, after fourteen days, acquire the size and organisation of the well-known *Trichina spiralis*. 9. Soon after the intrusion of the parasite the infested muscular fibre loses its original structure, the fibrillæ collapse into a finely granular substance, whilst the muscular corpuscles change into oval nucleated cells. 10. The infected muscular bundle retains its original sheathing up to the time of the complete development of the young trichinæ, but afterwards its sarcolemma thickens, and begins to shrivel at the extremities. 11. The spot inhabited by the rolled-up parasites is converted into a spindle-shaped widening, and within this space, under the thickened sarcolemma, the formation of the well-known lemon-shaped or globular cysts commences by a peripheric hardening and calcification. This degeneration commences several months after the wandering. Immature muscle-trichinæ are not capable of producing infection. 12. The migration and development of the embryos also take place after the transportation of impregnated trichinæ into the intestines of a new host. 13. The further development of the muscle-trichinæ into adult animals is altogether independent of the formation of the calcareous shell, and occurs as soon as the former have reached their completion. 14. Males and females are already recognisable in their larval state. 15. The immigration of the trichina-brood in masses produces very grave or even fatal consequences, such as peritonitis (from the embryos perforating the intestinal walls), pain, and paralysis (resulting from the destruction of the infected muscular fibres). 16. The infection of man occurs especially through swine. 17. The muscle-trichinæ are so capable of resistance that they are by no means in all cases destroyed by the ordinary methods of roasting, cooking, pickling, and smoking. 18. As a rule, swine obtain trichinæ from rats, to which latter we also as the natural bearers have to convey them. Microscopic examination of flesh is, therefore, urgently recommended as a public preventive against all danger from trichinæ.'

Professor Leuckart, of course, assumes that the microscopic examination would be conducted by persons not only familiar with the appearances presented by trichinæ, but also with the characters presented by other parasites which might readily be mistaken for flesh-worms.

In regard to the alleged recent outbreak of trichinosis on board the school-ship *Cornwall*, I confess that I am sceptical as to its genuineness. I do not, of course, doubt for a moment that parasites of some kind or other have been seen, but I must beg to differ entirely as regards the inferences that were drawn from the facts observed. I think it a pity, also, that so long an interval as three months was allowed to elapse without the issue of any full report.* Those who have accepted the trichinosis-view of the outbreak without reservation have, I think, caused undue alarm by assuming (as Mr. Fleming, for example, has done) that the trichinæ which infected the boys 'must have retained their vitality in spite of prolonged boiling'. Cooking of the American pork, we were told, 'did not protect the boys from trichinosis.

Before entering upon the all-important question of temperature, I must first of all remark that in two out of three previously reported outbreaks of trichinosis in England, actual proof of the presence of parasites was wanting. In one of these the members of a large family had symptoms remarkably like those of trichinosis. At the request and advice of an eminent London surgeon, Mr. Gay, F.R.C.S., one of the lads permitted the removal of a small portion of muscle from his leg by operation. I examined this vivisectioned fragment with the microscope. Not a trace of trichinæ existed. The other alleged outbreak to which I allude was that reported by Dr. Armistead from Thaxted, in Essex (SANITARY RECORD, old series, June 27, 1879, p. 409). In this instance forty-four persons had symptoms of irritant poisoning from eating sausages. Again the severe sickness was assumed to be due to the consumption of American pork; and, yet, as a matter of fact, not a particle of evidence affording proof of the existence of trichinæ was produced. To be sure, the treatment was directed towards killing the worms, and yet no worms had ever been seen. The poisoning was probably due to botalismus.

* *Parasites*; a treatise on the entozoa of man and animals. J. and A. Churchill, 1879.—'Our food-producing ruminants and the parasites which reside in them. Cantor Lectures, *Journ. Soc. Arts*, 1871.

* Since the delivery of this lecture copies of the Report have been circulated. After careful perusal of the very able articles that have appeared in the *British Medical Journal* and in the *Lancet*, I must, with all due deference to the learned writers, respectfully state my belief that the parasites seen by Mr. Power and his coadjutors were not trichinæ properly so-called.—T. S. C.

I must now enter upon the most important phase of the question at issue. According to the parliamentary reports, Lord Thurlow 'expressed some doubt as to whether ordinary cooking would destroy trichinæ'. Let us endeavour to set this matter at rest. It will save time, however, and there will be no irrelevancy, if, whilst adducing proofs in connection with the question of the temperature necessary to destroy trichinæ, we, at the same time, deal with the equally important question as to what amount of cooking will kill *cysticerci* or the larvæ of tapeworms. These young tapeworm-parasites are much more common in the flesh of animals than trichinæ.

Of the several investigators who have dealt practically with this question, I think we may accord to Professors Pellizzari and Perroncito, and to Dr. Lewis, the first rank. The labours of Dr. Thudichum will be alluded to subsequently. The Italian experimenters, it is true, have placed their results somewhat in antagonism, but taking the research as a whole, they are very complete.

Dr. Lewis, whose experiments exclusively refer to the measles of beef and pork, remarks '1. That exposure to a temperature of 120° Fahr. for five minutes will not destroy life in cysticerci, and they may continue to manifest indications of life for at least two or three days after such exposure; 2. That exposure to a temperature of 125° Fahr. for five minutes does not kill them; but, 3, after being subjected to a temperature of 130° Fahr. for five minutes, they may be considered to have perished. After exposure to this and higher temperatures, in no instance have I been able (he adds) to satisfy myself that the slightest movements took place in their substance when examined even under a high power. At least, it may be confidently asserted that, after exposure for five minutes to a temperature of 135° to 140° Fahr., life in these parasites may be considered as absolutely extinct.'

Dr. Lewis is known as an investigator possessing unusual powers of observation; nevertheless, in the matter before us, I believe the researches of Pellizzari and Perroncito have been conducted, if not with more care, at all events upon a much more extended scale. Even these gentlemen appear to have been misled by their earlier experiments. Thus, a few years back, Professor Perroncito said: 'I introduced some little slices of muscle-flesh infested with cysticerci into a vessel containing fat at the temperature of 190° to 200 Cent. (374 to 400 Fahr.)' and yet he adds, 'the cysticerci were well preserved.' Further, he was led to say: 'If it is not certain that the cysticerci die at from 80 to 100 Centigrade (176 to 212 Fahr.), we are quite sure that they dry up and become completely mummified at 125, 130, and 150 Cent. (=257, 268, and 302° Fahr.')

These statements drew Professor Pelizzari into the field. He instituted a series of experiments, the results leading him to criticise somewhat severely the conclusions of Perroncito. In these researches he was ably assisted by Dr. Tommasi, to whom, indeed, I stand indebted for placing my smaller works on parasites before the Italian public.

Professor Pelizzari found that cysticerci, so far from requiring a temperature of upwards of 100° Centigrade for their destruction, die at a temperature of 60° Centigrade (140° Fahr.). He had, it appears, previously taken the initiative in recommending certain measures to the Florentine municipality, in view of protecting the public health, and he had now the satisfaction of more than confirming the wisdom of these sanitary precautions. In excessively measled animals the fat is removed and boiled in suitable cauldrons, and has potash mixed with it to render it useful for industrial purposes. By the measures adopted the entire animal is utilised.

Professor Pellizzari having (in the course of a communication to the Medico-Physical Academy at Florence) remarked that his colleagues' propositions were of no value whatever, Dr. Perroncito returned to the subject, and by a new series of experiments, conducted with extreme care, finally ascertained that the cysticerci perished at a much lower temperature than even Pelizzari had stated; namely, at 50° Cent. (=122 Fahr). In May 1877, Professor Perroncito himself kindly furnished me with an account of his researches, which, after a few verbal alterations, were recorded as follows:

'In order,' says Professor Perroncito 'to resolve the highly important question of the tenacity of life of the Helminths and corresponding larval forms, I made since 1871 a very long series of experiments on the *Cysticercus cellulosæ*, which were published almost at the same time with others of the same kind, made by Dr. Lewis in Calcutta. Towards the end of 1874, Mr. Pellizzari of Florence disputed the results of the investigations which I had made known two years before, *i.e.*, in 1872, and agreed with Dr. Lewis, who had stated already that the cysticercus exposed to a temperature of 55° Cent. can be held for dead after five minutes, and also with Dr. Cobbold, who thought the temperature of 60° Cent. quite enough to kill it. But the characters he (Mr. Pelizzari) relied upon, needing the exactness and precision required to enlighten and persuade in the most important scientific questions, gave rise to a mistrust in the most scrupulous amongst the men devoted to biological pursuits, and to doubt respecting the value of the several hygienic measures adopted on the part of the sanitary inspectors with regard to infected pork. Therefore, my conclusions, argued from the experiments made in 1871-72, were still those followed by the most prominent Italian cities, and approved in principle by the superior Board of Health in 1873. I expressed doubt then about the cysticercus dying at a temperature lower than 100° Cent., and some person misconstrued these doubts, saying that I had contradicted myself in my work. However, as I could not assert they died at 80°—100° Cent., I only noticed the alteration of colour and cohesion which happened in the cysticercus exposed to various degrees of temperature, to the end that I might contribute usefully to the solution of the difficult question, and concluded that "if we could not be sure of the cysticercus dying at 80°—100 Cent., it was certain at all events that they perished at 125 or 130° Cent. Not wishing to prejudice the question, I never said that they did not die at 80°—100° Cent., but simply stated that at this temperature we could not be certain of their death. Now, after a large number of fresh experiments, I have been able to ascertain with exactness the lowest degree of temperature required to kill infallibly the cysticercus and other parasites of animals.'

Of course, Perroncito's experiments included the trichinæ, and on this part of the question his statements are brief, clear, and emphatic. He says: 'The *Trichina spiralis*, both free and in a cyst, always died at 40.8° Cent.' Finally, he says:

'Each experiment lasted about ten minutes, and the temperature rose from 8-10° C. to 45-46 C. in six to eight minutes; and from 46° to 50° in one minute.

These experiments have a great value, both scientific and practical, as they show, on one side, which is the lowest intensity of heat sufficient to kill always the Cysticercus, the Trichina, and other parasites. They assure us, moreover, of the harmlessness of the flesh infected by the above-mentioned parasites, when it is cooked in such a manner as to reach the temperature of 50° C. (122° Fahr.) over all points of the pieces, even though it be kept at such a degree of heat not longer than five minutes.

'In a piece of leg of pork the Cysticerci were found alive in all places not yet putrefied twenty-nine days after the animal had been slaughtered. In the dry muscles of a calf the Cysticerci of the *Tænia mediocanellata* were all found dead fourteen days after the slaughtering of the animal. However, I have ascertained that the putrefaction of the flesh is fatal for two larval forms of different kinds of helminths.'

After these extended investigations, it is to be hoped that we shall have no more false alarms, and that those of us who tell people that they need only take the precaution to have their food thoroughly cooked will not be subjected to ridicule in the pages of any respectable journal. Careful experiment has placed it beyond all doubt that Trichinæ perish at a temperature far below boiling point, even below 50° Cent., or 122 Fahr., whilst the cysticerci or measles infesting beef and pork perish at a temperature considerably less than this. As a practical hint, however, I must warn people against assuming that the interior of large joints (having an outside appearance of thorough cooking) is in all cases raised, even to this comparatively low degree of temperature. In rapid cooking, the dangers from this source are obvious. The only genuine outbreak of Trichinosis yet recorded in England is that which occurred in Cumberland in April 1871. This outbreak, as such, was discovered by Dr. W. L. Dickinson, of Workington; but, before publishing any particulars, he was good enough to submit portions of the animal supposed to have caused the disease to my inspection. Accordingly, when I had spent five minutes, more or less, in determining this question, the facts were immediately communicated to the pages of the *British Medical Journal;* and subsequently, all the particulars were made public through the medium of the Cantor Lectures, which, at the time, I happened to be delivering before the Society of Arts. I will only add that the outbreak was limited to a farmer's family, three in all. The widow and her daughter made a rapid recovery; but the man-servant, who had eaten heartily, perhaps voraciously, was excessively ill, and had a very narrow escape. He slowly recovered; but so persistent was the muscular paralysis, that for some months he required the support of a stick in walking. The family in question had eaten the pork of a home-fed pig, or rather a sow, and that sow had, in all probability, infected itself by devouring the remains of a dead rat. English swine are, I believe, singularly free from trichinæ; and, with this, and perhaps one other exception, it may be doubted if any other genuine case of trichinosis in home-fed pigs has been seen. I have examined Yorkshire and other English hams, and have always found them free from these parasites.

If cases of trichinosis were at all common in the United Kingdom, we should expect to find them in Ireland. No one desires to interfere with that excellent measure of home-rule, which makes pork and potatoes the principal source of subsistence. Dr. Dickinson, indeed, informed me that the late Sir Dominic Corrigan told a gentleman in the House of Commons 'that he had often met with trichinosis in his practice in Dublin', further averring that the disease 'was quite common in many parts of Ireland'. If Sir D. Corrigan merely desired it to be understood that he had repeatedly encountered the trichina at *post-mortem* examinations, then there is nothing surprising in his statement, but if, on the other hand, the disease itself has been frequently recognised in the living Irish human subject, one can only express astonishment that hitherto no single instance of the kind appears to have been recorded either in the public or professional journals. I have myself examined the muscles of ten or twelve individuals, in whose tissues trichinæ were found *post-mortem*. This naturally leads me to say a word or two about inspection. According to Dr. Eulenberg's recently published report (*Brit. Med. Journ.*, Feb. 28, 1880), the examination of pigs for trichinæ and hydatids in Prussia for 1878, shows that out of 2,524,105 pigs examined, 1,222 contained trichinæ; whilst 6,165 pigs contained hydatids. Allowing that the examinations were not in all instances perfectly conducted, still, so small a proportion as only one trichinæ-infected animal in about 2,000, shows that the dangers from this source are by no means so considerable as is generally supposed. To arrive at these results, it appears that no less than 16,251 official inspectors of meat were employed. According to Drs. Belfield and Attwood, about 8 per cent. of swine slaughtered for the American market contain trichinæ. There is, therefore, a clear danger to consumers from this source. Last autumn, Principal Simonds and Professor Browne (R.V.C.) fed two pigs with trichinous American pork, received from Liverpool, and they thus succeeded in trichinising the English pigs. After what has happened in this country, it may well be doubted if all the inspectors in Prussia were properly qualified for their seemingly easy task. Let me say that, in some half dozen instances, swine's flesh has been sent to me to pronounce upon (or to verify the existence of supposed trichinosis), when the unnatural appearances were found to be due to the presence of crystalline deposits of tyrosin and other concretions. In several instances, I have had occasion to correct errors of interpretation, where perfectly harmless psorospermial sacs have been supposed to represent injurious parasites; and in two instances I have been requested either to verify or disprove the existence of measles or cysticerci, when the supposed parasites were neither more or less than the cut ends of nerves, naturally present in the muscles. An inspector in one of the largest cities in England, who was one of those who favoured me with these supposed beef-parasites, is careful to state in a letter:—'The beef was fed in this country. Butchers say they never saw anything of the kind before.' What observant people these practical business-men must be. Occupied daily in cutting up flesh, they never saw such a thing as a cut nerve in their lives! As to the worthy officer of health who sent the specimen, so highly did he estimate the value of his parasitic 'find', that I could hardly refrain from uttering a spasmodic laugh when I read the closing request to this effect:—'May I venture to ask that it may be returned?' Not only did I fail to return the specimen, but it was deposited in the Museum of the Royal Veterinary College, and has since been shown to scores of pupils in that institution.

Another inspector wrote to thank me for getting

a most breezy spot, commanding a magnificent view of Devon scenery, facing the hills of Dartmoor; the origin of which, at the time, I was at a loss to account for, but which I should now put down to atmospheric infection, for, at a distance of four miles off in the valley beneath, there had been one or two cases, but the strictest inquiry failed to discover any connection save that of the atmosphere. In the early part of August last year a few cases of diphtheria appeared in the village of Beaford, which quickly passed off without spreading to any extent. On the 8th of September, however, an isolated farm-house in the parish of Woolfardisworthy, no less than thirteen miles away, in a west-south-west direction, became affected with diphtheria, six cases and one death being recorded; this farm-house was two miles from the village, and it very shortly afterwards broke out in the village; now, it is a remarkable fact, that although after the disease arose in the village, its propagation could easily be traced from one to the other; yet its first origin, unless we admit that the atmosphere carries it, is hid in obscurity, for there had certainly been no connection between the Beaford cases and the farm-house; nor when the first case at the latter place occurred, was there any communication with the village; yet the village appears to have derived its contagion from the farm-house; at all events, the farm-house was the nearest propagating centre.

Of the epidemics or partial outbreaks in my district, for every one so-called sporadic case which has occurred in valleys, five have broken out on, comparatively speaking, lofty breezy situations. It may also be remarked that in an epidemic at Ilfracombe, some years back, it was noticed that all the cases occurred in the higher parts of the town. This experience is in some degree supported by other clinical evidence.

I will not, however, go so far as to say, that there is a decided preference for airy situations, for it must be remembered that whenever a country is undulating, those who build houses for the most part prefer to build on an elevated spot rather than in valleys, so that nothing but an accurate census of the number of houses on high, as compared with low situations, could give absolutely trustworthy data; still, as an individual observation, to be considered in subsequent inquiries, it may be well to put it on record.

The truth of the theory, if not capable of exact experimental proof, yet may be either established or destroyed by careful observation of the isolated cases over large areas, which may be proved approximately to arise irrespective of personal intercourse; if, for example, we can have in the future, disease charts in which the direction of the winds, and the localities of diphtheria, with the dates affixed to each, are plotted out; and should, in the vast majority of these cases, the disease have no reference to prevailing winds, the theory is not tenable; but should the centres progress, as it is almost certain they will do, with the arrows, then such a fact would be a valuable confirmation. The other points to be noticed are, whether diphtheria is first a local disease, and then a constitutional; for, if it be caused by a fungus, or bodies of a fungoid nature, we must in all reason expect constitutional symptoms to follow and not precede. In Dr. Budd's cases, so far as can be ascertained, constitutional symptoms were slow in development; in many recorded cases, however, the malady has been so astonishingly rapid, that any trustworthy observations on this point cannot be made. Lastly, another question is, can the disease attack the same person twice? This question cannot be answered at present, satisfactorily. But should it be caused by vegetable growth, one would suppose that the same person might be attacked an indefinite number of times.

So far as these cases go, they somewhat support the German theory of the so-called 'Micrococci'; those who are acquainted with the history of the disease know that there is a most voluminous literature relative to the presence or absence of fungoid elements in the tissues affected with diphtheria as well as the blood.

The discovery of vegetable parasites is claimed by Hueter and Oertel, working independently of each other; Buhl, however, had, a year previously, called attention to granular vegetable bodies in the diphtheritic slough, but he left the question open as to whether they were merely accidental, or an essential of the disease. Other observers confirmed the observations of Oertel; it was found that inoculation would reproduce the malady. Oertel furnished what he considered proof, that the disease was at first entirely local, and this idea certainly derives support from the direct inoculations practised by Hueter, Tommasi, and Oertel on wounds; Trendelenburg on the trachea; and Nassiloff and Ebert on the cornea.

One of the last supporters of the parasitic theory, Letzerich, (*Die Diphtherie*, Berlin, 1872), distinctly states that the origin of the disease is a fungus penetrating from without into the substance of the mucous membrane. But these views have been neither wholly adopted, nor wholly rejected, in England, many accomplished microscopists having failed to find fungi in the substance of the tissues or the blood, for it is scarcely necessary to observe, that mere superficial moulds can have no pathological significance; but it must be remembered, that positive observations are ever of more value than theoretical negations, and that 'the vegetable forms observed comprise forms of such exceeding minuteness that they stand on the very borders of the visible'; hence, if this is really the case, we should expect only to get clear evidence of this microparasitic growth, under circumstances unusually favourable for observation. I must not, however, omit in justice to note, that so competent a committee as that of the Chirurgical Society have declared: 'In only one case—namely, a case where contagion was doubtful, have we found undoubted evidence of the presence of the minute ovoid or rounded bodies described by Oertel and others as the peculiar element of diphtheria. In that case we found clusters of micrococci, both in the false membrane, in the mucous and submucous tissues, and in the lymphatic spaces of the connective and intermuscular planes, deeply in the substance of the larynx. It must be understood that this statement refers solely to the respiratory tract, not to the pharynx or nares, in which the presence of such minute granules, and even of filamentous network, simulating, if not really such mycelium, are much more frequently found. We are unable, therefore, to draw any conclusion from this point.'* Aerial infection does not, however, require that the elements of contagion should be fungoid, the question as to their exact nature may well be left open. All that the theory requires is the emanation of material, excessively small light particles evolved from the affected mucous surfaces. This contagium

* *Report of the Committee*, Royal Medical and Chirurgical Society, appendix, p. iv.

we may suppose borne in clouds, and conveyed far and wide; fortunately by far the greater part falls on soil unsuitable for its development, and perishes. Probably it is only when it falls on a moist mucous surface that it can develop; and even when it does attach itself to the pharynx, doubtless, in many cases, it is unwittingly got rid of by the mere mechanism of swallowing, coughing, etc.

We know but very little about the etiology of diphtheria. The theory I have briefly enunciated to-night, is plausible, but, of course, not absolutely proven. Let us, however, hope, as practical hygienists, that action taken upon this theory will, in other cases, be as successful as it appears to have been in the hands of my friend, Dr. Budd; for, if we once assume that the germ of diphtheria is essentially a local disease first, and then a constitutional one, its ravages may most certainly be restricted by keeping the throats of the healthy who have to come in contact with the sick, so to speak, constantly disinfected; this, combined with other obvious precautions, based on the theory that the breath and discharges contain all the poison, should restrict the malady to those first attacked. All preventive measures, and especially those of the nature just pointed out, are of course greatly dependent for their success on the intelligence and co-operation of the patient and nurses, and will be the more difficult to carry out, the poorer and the more ignorant the sufferer.

I trust that many of the gentlemen round me will give this simple method a fair trial, and be able to celebrate, at last, a victory over a dread disease that especially kills our youngest and our fairest, and which has hitherto baffled preventive medicine.

NOTES ON INDUSTRIAL DWELLINGS.

By Elijah Hoole.

V.—TENEMENTS.

The room which accommodated a family in each corner, while a fifth family tenanted the middle, is no doubt mythical. So is the statement that the numerous inmates lived harmoniously together till the central family took in a lodger. But there is a grotesque horror about the manner in which the poor are often crowded together, which this description hardly exaggerates. Ten families frequently occupy a small house intended for one, and furnished with conveniences and appliances for one only. An incalculable amount of discomfort, loss of rest and quiet is the result of the unavoidable friction and interference of the tenants one with another, and exercises a degrading influence upon their characters, language, habits, and general behaviour.

It would, of course, be most desirable for every family to have a set of rooms complete in themselves, secure from all interference, and providing living rooms and separate bed-rooms for the parents, boys, and girls respectively. But as the rent of a room in London varies from half-a-crown to three or four shillings, and in the country bears a proportionate value to the wages of the district, it is obvious that a man who earns a pound a week or less cannot pay from one-half to one-third of his wages in rent. He therefore generally contents himself with a single room. Whatever the objections—moral, sanitary, and other, may be, and they are not without their weight—here is the fact which has to be dealt with, that as a rule the families of the lower working class live each in one room only.

In housing such families, you must adopt one of two courses. You must either give them two rooms at the price of one, or you must provide for their occupying, at any rate in the first instance, a single room. You cannot do the first, since all interest on the capital would thus be absorbed, and the tenants would be pauperised by receiving value for which they had neither worked nor paid. You are therefore bound—if you begin at the lowest round of the social ladder, and mean to help those to mount it who are in the most squalid and degraded condition—to provide single rooms to house an entire family. Disease and pauperism are most prevalent among the most degraded classes, and they are therefore most in need. Any plan for housing the poor which passes over or omits from its provisions those most in need of them, must be manifestly incomplete.

As to the moral effect of housing a whole family in a single room, Miss Ellice Hopkins may be quoted as an authority not merely having a thoroughly practical acquaintance with the subject, but as taking unimpeachably high ground. She says:—'Where, from extreme poverty or overcrowding, there is an inevitable paucity of room, often an earnest talk with the mother on the subject, and a little friendly contrivance, the gift of a curtain or a screen would obviate the worst consequences.' One of our most noted temperance speakers stated to a friend of mine that he was one of eight children; the mother, a widow in great poverty, and only able to afford one bed-room. 'It is mere nonsense', he said, 'to talk of indecency and immodesty being necessitated by want of room. My mother hung up a curtain right across the room, and the boys slept on one side and the girls on the other; and I will venture to say that we were brought up in as much modesty and decency as richer folk with a bed-room apart for each.'

Sir Sydney Waterlow—no mean authority on the subject—has publicly condemned the construction and letting of single-roomed tenements. His theory appears to be that by the construction of improved dwellings, and by the destruction of the existing nests of vice and disease, the one-room tenant can be gradually edged out of existence, or, rather, can be developed into a two-room tenant. He would provide no single rooms for families, but would allow families requiring a set of rooms to take one more than they wanted, and to sublet it to a single man or woman, but not to another family. How the financial difficulty of the man with a family earning only a pound a week is to be got over does not appear. If he cannot pay the rent of two rooms, he must stay where he is, so far as the Waterlow Buildings are concerned.

Miss Octavia Hill and Miss Cons, on the other hand, strongly advocate the building of single-roomed tenements, not because they prefer the families of the poor to be thus housed, but because they find so many families unable to pay for more than one room. These seemingly adverse theories are, after all, not very difficult to reconcile. Sir Sydney speaks from his own experience with the Waterlow Dwellings, which are tenanted by a very respectable working class quite able to pay for a suite of rooms for each family, and in whose case the living in a single room would be highly culpable. Many families now living in single rooms ought to pay for two or more. They are quite able to do so; but the money which should be spent on the home is wasted at the public-house. Nor is it any defect in the Waterlow Dwellings that they do not house the lowest stratum of the population. They do not

profess to do this; and what they profess to do—namely, to provide healthy and convenient sets of rooms for those who can afford to pay for them—this they do thoroughly and well. But they do not cover the whole ground; and, when they have done their work, there is a large class still to be provided for. For this class, at any rate for a time, the one-roomed tenement is a necessity; but it should be so planned, that it may be used as part of a suite of rooms without altering the building. This may be effected by means of a recessed porch or entrance passage open to the external air, and giving access to several rooms, which may then, without alteration, be let either singly or two, three or four together, as the tenants improve in their habits, and, consequently, in their earnings and rent-paying power.

One-room tenants can only be attracted by the offer of a better arranged and better lighted room than the one they now occupy, at about the same rent, and it is very important to attract them, and to bring them under the control and influence which regulates a well administered block of industrial dwellings. On the management of the various tenements, and on the judicious superintendence of them by people of the upper class, and especially by ladies who take an intelligent and friendly interest in the welfare of their poorer neighbours, the real success of all dwellings for the lowest stratum of the working class must ever depend. The paid collector will do well enough for the management of the better kind of industrial dwellings, inhabited by clerks and superior artizans, who have been selected from a long list of applicants, carefully weeded from all doubtful characters. Such tenants punctually leave their rent at the office, either at or before the collectors call, and very rarely give trouble to the managers in any way. But the tenants of one or two rooms, of whom we have been writing, are of quite a different stamp, and however excellent the arrangements made for their comfort in new dwellings may be, they would soon relapse into the miserable squalor of the courts from whence they came, unless they had the advice and sympathy of some kindly and educated person acquainted with their position and wants. Such a collector is really a volunteer, even though paid the usual percentage for collection, which will barely pay for the time and trouble expended, and still less for the interest and sympathy on which successful management depends.

Twelve feet square is a good dimension for single room tenements, which should not be less than 8 feet high, and may be as much higher as the funds will allow. One window to each room is enough, but it should be a large one, not less than four feet wide, and extending from two inches of the ceiling to within rather more than two feet of the floor. Sash windows are preferable to casements; for, though the latter are more picturesque, they are also more draughty, and the glass in them is more easily broken. All windows should open at the top. A wide window-sill for flowers and window gardening, with a strong rail to prevent the pots from falling, is an essential and important feature in the fenestration.

For ventilation, a narrow opening, about three inches long, may be cut in the meeting rails of the window sashes, each side of the window fastening. This allows a small upward current of fresh air to enter the room without draught. All ventilators, however scientific their construction, are, if in view, invariably stopped by the tenants This one has the merit of being out of sight, and if stopped up must be freshly stuffed up every time the window is opened. Even one-room tenants will hardly do this.

The fireplace is one of the most important parts of the one-roomed tenement, and cannot be too carefully considered. Simplicity and strength are very important, especially where the tenants are of a rough and low class. In some courts it is, or rather was, the custom of the tenants when leaving one lodging for another, to tear out the fireplaces and take them away. To meet this difficulty, a strong wrought-iron grate was designed, and so built in that it could not be removed, without pulling down the wall behind it. But for a better class of tenant this precaution is not needed, and a small range, with a large oven, will be best. Many of the smaller ranges, which look convenient enough, are too diminutive to be of much use; and others, in which the oven is of a good size, are too slight in thickness of metal, and are soon either broken or burnt through. Another difficulty arises from the great size of the cooking-pots used by the poor, which, if placed on the fire, will often reach from hob to hob, covering the fire completely, and driving the smoke out into the room. A very large opening above the fire is also required for them, and the draught of the chimney is thus seriously diminished, especially upon the upper floors, where the flues are necessarily short. Messrs. Barnard, Bishop and Co., the well known makers of the slow combustion stove, have, in their 'Diamond' cooking range, overcome these difficulties, and produced a grate admirably adapted for industrial dwellings. The fireplace is small and economical of fuel, while the oven is large, and being placed below the fire, is well situated for gaining heat and saving space. A moveable hot plate above the fire makes the stove either a close or open one, at pleasure, while the draught cannot be blocked by anything placed over the fire, since a wrought-iron flue behind the range conveys the smoke to the chimney. This range is only eighteen inches wide, and is exceedingly strong in its make. Its price is higher than that of the ordinary pattern, but is still quite within the reach of the designer of Industrial Dwellings. A boiler cannot safely be attached to a cooking range, except for the use of a superior class of tenant. If the boiler needs filling by hand, it is neglected, and is soon burnt through for want of water, while, if self-supplying, the cost of plumber's work is much increased, as also are the chances of leakage, overflow, etc., to say nothing of careless or wilful damage by the tenants themselves.

A supply of coal for the range is contained in a coal bin fixed under the window, or in some convenient part of the room. Three feet long by two feet high and eighteen inches wide, is a convenient size. The lid opens like that of an ordinary box, and when shut down forms a convenient seat. With a good cupboard to serve as larder and pantry, and with a mantelshelf over the fireplace, the fittings of a one-roomed tenement are complete.

Mr. P. J. Byrne, who has been surveyor and sanitary inspector to the Windsor Rural Sanitary Authority for the past seven years, has been re-elected for a further period of three years, at a salary of £175, subject to the approval of the Local Government Board.

Dr. C. B. Fox, late Medical Officer of Health for East Central and South Essex, was, on April 29, elected a Fellow of the Royal College of Physicians, London.

ON THE LIMITATION OF INFECTIOUS DISEASES,

THROUGH THE AGENCY OF TRAINED NURSES.

By the Rev. J. H. Timins, M.A., of Trinity College, Cambridge, F.G.S.,
Student of St. Thomas's Hospital, London; Treasurer of the Kent Nursing Institution, West Malling.

In a treatise on 'Artificial Disinfection', published by Messrs. Churchill in 1878, I gave full particulars of the results which had been attained by it in the eradication of small-pox, scarlet fever, and diphtheria, in numerous outbreaks of those diseases which had occurred, in four successive years, in ten sanitary districts in Kent. In several hundred cases, sometimes under the most unfavourable sanitary conditions, and frequently without any means of isolating the infected, all the outbreaks of those diseases were encountered and controlled, without a single instance of even partial failure, by an efficient system of disinfection, judiciously and perseveringly carried out by nurses specially trained and instructed for the work. In the present paper, I propose to give some practical information as to the means by which this was effected.

The suppression of scarlet fever, by a systematic course of disinfection, was shown to be practicable, by Dr. Budd, nearly thirty years ago. In his pamphlet on the subject, of which the fifth edition, from which I quote, was published in 1871, he justly observed that 'the one thing to aim at is to annihilate the contagia on their very issue from the body, and before the patient leaves the sick room; and to prevent the minute particles, which are the carriers of the poison, from taking wing until they can be disinfected *in situ*'. The disinfectants on which he chiefly relied were the chlorides, the sulphate, and the perchloride of iron, the permanganate of potass, and camphorated oil for the skin. The rules laid down by Dr. Budd have formed the basis of all subsequent instructions for the prevention of the spread of infectious diseases, and little of any real value has been added to them.

A Sanitary Aid Association has been in successful operation at Hastings and St. Leonard's for the last nine years. It was founded by Mrs. Johnstone, whose lectures on the subject, prepared originally for a lady's class at Hastings, contain most valuable instructions on all that is most important in disinfection, given in a popular and agreeable manner.* There is a Sanatorium, which has now been taken in hand by the Corporation, for the reception of cases which cannot be properly dealt with at home; and a paid visitor is permanently employed, under Mrs. Johnstone, to supervise the use of disinfectants supplied by the sanitary officer, and to see to the disinfection of any house in which a case of infectious disease may have occurred. The disinfectants are chosen by the medical officer of health for the borough. Chloralum is used for the disinfection of the patients' discharges and clothing; and chlorine, evolved by pouring hydrochloric acid upon chlorate of potass, for fumigation. Chloralum parts with its chlorine, when dissolved in water, and deposits an aluminous gummy residue, which adheres in yellowish brown patches to the linen, and discolours the blankets. This must rather discourage its free use for steeping infected clothing.

In the year 1875 I made arrangements for carrying out the work of disinfection through the agency of trained nurses, with the following rules:—To visit every infected house two or three times a day for the first fortnight, and daily, at least, afterwards, for a period of six weeks in small-pox or typhus fever, and for eight weeks in scarlet fever or diphtheria, from the first commencement of the disease. To destroy all contagia by the immediate and complete disinfection of everything which may issue from, or may have been in contact with the bodies of the sick; and to disinfect the floor and furniture of the sick rooms, and all drains and closets which may have been used by any infected person. To cause disinfectants, of the proper strength, to be placed in pans to receive all handkerchiefs, towels, and bed and body linen, which may have been used by the sick person, immediately on their removal from his bed or person; to see that a pint of the disinfecting solution be placed in every chamber vessel before it be used by any infected person; to protect beds from being soiled, by using waterproof sheeting, which must be often changed and cleansed, first with the disinfectant, and afterwards with cold water. If the patient be subject to cough, to place a yard of calico over the bed clothes, and change and disinfect it night and morning; and to protect the pillow by placing pieces of calico under the cheek, when necessary. In scarlet fever, or small-pox, to collect and burn any dried matter or skin which may fall off, and see that the patient be washed or sponged with disinfecting soap or lotion. To use heated iron spoon for vaporizing, or spray producer for dispersing suitable deodorants and disinfectants in the sick room, when necessary. To fumigate the sick room, with the usual precautions, as soon as the patient can leave it. In the event of death, to prepare the body for interment, using sufficient means of disinfection to protect the inmates of the house, and attendants at the funeral from all risk of infection. To disinfect all public elementary schools attended by children from within the infected district, if allowed by the managers to do so, and fumigate the children's caps and cloaks in the lobbies. To assist in nursing the sick; to supply them with proper nourishment and clothing, when entrusted with the distribution of them; and to keep a correct account of all relief so administered by them. To give immediate notice to the sanitary officer of all nuisances dangerous to health in the infected district, and of all cases of infectious disease which may come to their knowledge in houses in which they may not be allowed to carry out the necessary means of disinfection. To make a weekly report of all cases of infectious disease in their district: giving the names and abodes of the families, the number of persons, and the number of cases of sickness in each family, the christian names and ages of all persons attacked by the disease, the date of its first appearance, and particulars as to the state of the patient in each separate case, and to send it to the lady-superintendent, who will transmit it to the proper authorities. The nurses will see to the disinfection of all clothes and linen, so that they may be sent to be washed without danger to any one; but are not to be required to do any washing or other house work.

It will be seen that the above rules are not intended for complete instruction in the work of disinfection, but only as a summary of the duties of a properly trained nurse, who will know how to adapt them to the circumstances of her district; and no rules are given which cannot be carried out in all places alike; in rooms with or without fireplaces;

* Mrs. Johnstone's lecture, 'How to Prevent the Spread of Fevers', delivered for the National Health Society on April 29, will be published in the Sanitary Record of June 15.

with windows with or without sashes; in cottages with or without more than one floor, and with or without more than one bedroom. The nurse must be prepared to take the people as they are, and their dwellings as she may find them. She will have to deal with infection where there are no means of isolating the patients or their attendants, or of efficient ventilation; to prevent its extension from house to house in crowded courts and alleys, from room to room in close and low-roofed dwellings, and even from bed to bed in the family bedroom; where mothers are attending to their household duties within and without the sick rooms, passing frequently from their sick to their healthy children, with no possible time to change their dress, or to do more than put their aprons on and off when they enter and leave the sick room. It would be useless to scold them for what they cannot help. The dinner must be cooked; the house must be cleaned; the children must be put to bed, and have their beds made for them; and the sick must be nursed; and one woman has to do it all. But a separate room for the sick is a luxury which is not always attainable. Often the mother has to take the sick child to a little bed in her living room, the only one in the cottage with a fire, and watch over it, whilst she gets through her work. Or a child is attacked with fever in a two-roomed cottage, inhabited by a dozen people; and the only way of isolation possible is to interpose a table between the sick child and the family. I have known this to have been done, and there was no second case. Where the nurse cannot isolate the patient, she must isolate the disease, by destroying the contagia. She knows that this is what she has to do, and she does it.

The first rule requires the nurse to visit every infected house two or three times a day, for the first fortnight, and daily, at the least, afterwards for a period of six weeks in small-pox and typhus, and for eight weeks in scarlet fever or diphtheria, from the first commencement of the disease. The period of eight weeks for scarlet fever seems long. In nine cases out of ten it might be abridged without danger; but in the tenth case it might cause a fresh outbreak. I have known infection communicated by a young woman to her little sister at the end of six weeks, and by a child six years of age to a schoolfellow of the same age, in an Infant National School during the seventh week. The rule is made so as to secure perfect safety.

No reliance can be placed on disinfection being properly carried out, without the continued supervision of the nurse. But to carry disinfectants to houses, and to give directions for their use, is not the most important part of her duty. She must also make her work acceptable, and secure the co-operation of the members of the families which she has to visit. She must be kind and sympathizing towards all who are in distress or trouble, and ready to give her help in nursing the sick whenever her skill and attention are required by their medical attendant, and to carry out his directions as carefully as she would do if she were nursing at a private case. She must make known the wants of the poor to the clergyman, or to the district visitors from whose attention they are cut off by the nature of their illness, and convey proper nourishment to the sick, if entrusted with its distribution. She must understand the character and prejudices of the poor, and gain their confidence and affection by showing that she loves them, and that by night or by day her services will be given to every sufferer. One important result of all this will be that there will be no concealment of cases from her. She will gain the earliest intelligence of every fresh case of infection, because all will feel that it will be to the advantage of themselves and their neighbours to make her acquainted with it. I have known important information to have been freely confided to the nurse, which would have been jealously withheld from the sanitary officers. I, of course, take it for granted that she will have the sympathy and support of the medical officer of health and the medical attendants of the sick; that she will be allowed to pursue her charitable, in conjunction with her sanitary work; and that she will not be degraded into the position of a mere disinfecting agent, employed as the servant of the sanitary officers, and to exercise a sort of police supervision under them. Once let her be regarded in this light, and her influence for good is gone.

In carrying out the work of disinfection, it must be carefully borne in mind that it is never really necessary to cause pain or inconvenience to the sick in providing for the safety of others. Therefore, all disinfectants must be avoided which may cause nausea, or irritation to the respiratory organs of the patient. As a rule, carbolic acid, if used with proper care and discrimination, is the best. It is just sufficiently volatile to purify the air of the sick room, and to neutralize the noxious gases generated in it, which would prove injurious to the patient as well as to the attendants. I have very rarely found Calvert's No. 3 or No. 4 objectionable, and No. 2 has always been acceptable. If this more expensive quality is necessary to be used in the sick room, the nurse will know how to use it economically, and to use the less expensive qualities where the patient cannot be annoyed by it. There are, however, certain constitutions, and certain forms of disorder for which carbolic acid ought not to be used. And wherever the nurse may find that this is really the case, she must do the best she can with Burnett's fluid, and the permanganate of potass; using some means of fumigation for the purification of the air of the sick room; such, for instance, as camphor and acetic acid, vaporized. But no reliance must be placed on any disinfectant of which the disinfection value has not been accurately determined by experiment, nor unless it be used in the proportions which have been demonstrated to be sufficient for the neutralization of the infective matters which proceed from the sick. I have said nothing under the head of 'Disinfection of Sick Room', because, if the nurse have the charge of the case from the commencement of the illness, the sick room will not become infected, and also because the means usually recommended for its disinfection could never effect it. All that can be done, so long as the patient is in the sick room, is to disinfect the floor and furniture. If disinfection have been neglected, and if it be apprehended that contagia may have found their way into the floating matters in the air, a sheet saturated with disinfectant may be placed over the door; but neither that, nor hanging wet cloths about the sick room, can contribute materially to its disinfection.

In preparing a body for interment, the nurse will be guided by the circumstances of the case. The least that she will do will be to spread Calvert's Carbolic Powder thickly over the bottom and sides of the shells, and over the corpse, and place some carbolised cotton wool round the mouth and nose, to receive any possible effusion therefrom, with other precautions, which need not be particularised. In addition to this, in such cases as hæmorrhagic small-

pox, the sheet in which the body will have been wrapped must be afterwards saturated with carbolic acid. The body must be rendered innocuous before the admission of any undertakers' men. When an undertaker who buries a small-pox patient, catches the disease, it may be taken as a sure indication that the nurse has not understood her duties. She will sometimes have, herself, to fasten down the lid of the coffin. When proper precautions have been taken, the funeral should be decently conducted, in the day time, without anything that may shock the feelings of survivors, or contribute to a panic in the neighbourhood.

The closure of public elementary day-schools is never necessary, and often mischievous. No good can come from sending a number of children, of all ages, to run about the streets and lanes, and in or out of courts, alleys, and cottages, all through the day, in any infected district. The nurse will see to the disinfection of the school buildings, as well as of the school children. After school hours, the floors, forms, and desks, can be mopped over with a solution of Calvert's Carbolic Acid, No. 3 or No. 4, containing four ounces to the gallon of water. The closets and urinals must be daily flushed with a solution of No. 5 Carbolic Acid. Once a week at least, preferably on Friday afternoon, the caps and cloaks must be fumigated with sulphur in the cloak lobby. Young children often wear each other's caps; and the cloaks hang over each other in the lobby; which makes it necessary to disinfect them all. The nurse will see that there are as many caps as heads, and inquire for the missing caps, which will be found in the boy's pockets. On Friday evening the school-rooms may be fumigated, and cleaned up the next day, so as to make all safe for the Sunday-school, which will be opened as usual. The nurse will be in charge of all the fever cases in the district, and will take care that no child shall go to school in a dangerous state. If the infected children in the family have been kept separate for a fortnight, the healthy children may go to school; their clothes having been first damped with the carbolic acid solution, and dried in the air, and carbolic soap having been used for washing. The schoolmaster and schoolmistress will have carbolic soap for the children's hands, and some carbolic acid within reach for mopping the floor, if any child should vomit upon it. Those who have had scarlet fever must not go back to the school for eight weeks from the commencement of the illness. No law could keep them in quarantine for that period, and no father could be punished because his children run out when he is away at his work. As soon as children begin to run about, their bodies, and especially their hands, will be kept sponged by a disinfecting lotion, consisting of one part of Carbolic Acid, No. 2, in fifty parts, of a mixture of glycerine and rose-water. This is far more cleanly and pleasant than oil or lard, as well as more efficacious.

What has been said of school children is applicable to all persons living in a house in which there is a case of infectious disease under the supervision of a properly trained nurse. She will not have allowed the house to become infected. But those who have to go in and out of the sick room, or are much in the company of the person who is actually nursing the patient, must have their clothes damped with a solution of Carbolic Acid, No. 2; carbolic soap being also used by them for washing. The bread-winners of the family may then safely go to their work. There is no need whatever for the barbarous practice of shutting up able bodied men in their cottages, to starve their wives and children, or to prey upon the ratepayers, on the ground that they are living in an infected house. There ought to be no such thing as an infected house, or even an infected room. Those who are clamouring for local acts, to enable them to enforce a harassing system of domestic quarantine, would do well to consider whether they need fresh powers from the Legislature, or more sound scientific knowledge and intelligence, in using the powers which they have under the present laws.

The weekly report which the nurse in charge of an infected district is required to send to her superintendent is the only reliable test of the success or failure of disinfection. The heads under which particulars have been given in each case are:—1. Name. 2. Abode. 3. Number in family. 4. Number of cases. 5. Christian name of patient. 6. Age of patient. 7. Date at which the illness commenced, and, 8. Remarks. Any fresh case occurring in the vicinity of a former case, after the termination of the usual latent period, would thus be immediately noticed, and the cause of it promptly investigated by the superintendent, on the spot. We allow a fortnight for the latent period, but have found ten days to be sufficient for scarlet fever, and twelve days for small-pox. I am, of course, aware, that longer periods of incubation have been occasionally noted, and I have myself seen one case of scarlet fever in which the period was apparently a fortnight; but we should look very suspiciously into any case in which the latent period might be assumed to have extended beyond the limits ordinarily observed. Copies of the weekly reports were forwarded regularly by the superintendent to the medical officer of health for the district, who verified them from his own notes of the cases. Thus, the certainty of disinfection, when properly carried out, as a means of preventing the dissemination of diseases by infection, was established on the clearest evidence.

I must here observe, that these results can only be fairly expected when the nurses have had special iustruction for the work, and that it cannot be safely entrusted to nurses who have had only hospital training. I have seen the latter tried in several places, and it has always proved, more or less, a failure; and in one case the results of the failure were most disastrous. I mention this as a caution to members of Sanitary Boards, who cannot be expected to know the difference between one kind of trained nurse and another. Of course, all professional men know that disinfection forms no part of the curriculum of medical education, or of the hospital training of nurses. It is unfortunate for the public that the importance of this subject has hitherto been so much ignored.

EFFLUVIUM NUISANCES.

ON two former occasions (March 29, 1878, and February 7, 1879) we have referred somewhat in detail to the admirable manner in which Dr. Edward Ballard was pursuing the inquiry into the effluvium nuisances arising in connection with various manufacturing and other branches of industry, which had been confided to him by the Local Government Board. At the date of our last article on the subject, Dr. Ballard had completed his report upon the industrial processes concerned with animals, animal substances, and vegetable substances; but the more important question of trades concerned with mineral substances remained to be dealt with. During

the interval, Dr. Ballard has been successfully pursuing his researches into this large branch of the subject, and the final results of his inquiry have now been published as an Appendix to the Report of the Medical Officer of the Local Government Board for 1878.

The mineral trades that come on the present occasion under review are brick and ballast burning, cement making, the firing of pottery, lime burning, the manufacture of coke and breeze, of coal gas, of sulphate of ammonia and sal ammoniac, tar distilling, the dipping of iron pipes, the manufacture of artificial fuel, asphalte, and lamp-black, of carbolic acid, picric acid and aniline, distillation of oil shale, the manufacture of sulphuric acid, salt, alkali, bleaching powder and glass, calcination of iron-stone, hardening of steel springs and saws, spelter works, galvanising and tinning of iron, tin burning, arsenic works, copper smelting, manufacture of nickel, lead smelting, the melting of old metal, and the refining of gold. In addition, Dr. Ballard has made additions to other sections of his subject by reports on the manufacture of horsehair, the manufacture of wood-pulp, and the preparation of ammonia material for gas-works, and has dealt with pharmaceutical works and general chemical works, rag and bone shops, and the manipulation of the refuse of towns. These trades bring up the total of the different kinds of business into which Dr. Ballard inquired to some 70, represented by 850 separate trade establishments, distributed over nearly all parts of England and Wales, and a few of them in Scotland and Ireland. In very many of these establishments, if not in the majority of them, more than one offensive process was being conducted. It is worthy of being recorded that, during the whole course of the inquiry, Dr. Ballard was only on five occasions denied the privilege of inspecting works that he desired to inspect. In all the other instances his visits, on his explaining their object, were welcomed; and not only so, but the proprietors of the works themselves or their managers conducted him through their works, and took infinite pains to explain fully to him the details of their processes; and they freely, and some of them repeatedly, discussed with him in the most unreserved manner points of chief importance to his inquiry. Eight out of the twelve photographs with which the reports have been illustrated are from negatives taken at the expense of the proprietors of works; and of the other illustrations, nearly all (with the exception of some diagrams which Dr. Ballard made himself) are from drawings similarly supplied. All the more important articles have been read in proof and corrected in their technical details by distinguished manufacturers—a most important aid, as ensuring a technical accuracy which could not otherwise have been attained. This willing and active co-operation on the part of manufacturers seems to us to be one of the most gratifying features of the whole inquiry, as testifying to the anxiety of these gentlemen to do all in their power towards securing a minimum of offence to the community from the exercise of their callings.

It would be quite impossible, in the limited space at our disposal, to offer any detailed comments on the medico-sanitary aspects of the different trades reported on; and we must therefore confine ourselves to some observations on the general outcome of the inquiry. Its governing idea has been to study effluvium nuisances in their relation to the health of the community; and thus their influence within workplaces upon persons voluntarily subjecting themselves to such nuisance has been studied chiefly as it might throw light on the nature or circumstances of the influence which the nuisance could exert upon the outside public. The object of the inquiry has been two-fold: first, to learn the extent to which the public health is injured by offensive trades or trade processes under various conditions; and, secondly, to ascertain to what extent and in what circumstances nuisance and injury to health can be avoided. In the study of the former problem, it was found impracticable to apply the numerical method to the differential investigation of sickness or mortality as influenced by proximity to offensive trade establishments; and the only method open to Dr. Ballard consisted in applying his own experience as a physician and sanitary observer to the estimation and interpretation of the health condition of people exposed to various influences; and in gathering up similar estimates from the experience of others, notably of Medical Officers of Health. The resulting conclusions brought forward by Dr. Ballard thus rest on a broad basis of careful observation by those whose opportunities have been of the best; and, while they constitute a valuable point of departure for further more detailed inquiries, his conclusions form by themselves an important addition to our previous knowledge of the subject.

The general result amounts to this: There are first a variety of influences upon health exerted by offensive trade processes, which are not only offensive, but are concerned with definably infectious materials, or with poisonous materials in quantity, and are thus specifically infectious or poisonous to workers or to neighbours. Thus, danger from infective matter arises in the case of trades that deal with old wearing apparel and with foul house-refuse. At ragshops no inquiries are made of the sellers as to the source of rags offered for purchase, and there must be many hundreds of persons every year who transmit with impunity infected rags and old clothes to the shop of the marine-store dealer, in ignorance or in wilful contempt of the risk of so doing. When once these things have arrived at the store, their infective nature is lost sight of, and disease propagated by them cannot afterwards be traced to its true source. The danger to the community from such shops as these in London and other places where similar establishments exist, cannot be estimated.

Again, the manipulation of horsehair infected with the contagium of 'anthrax' has been found to be attended with serious and specific risks. This danger arises from the dusty matters given off when hair thus infected is manipulated. The danger of the workpeople contracting disease is present in every stage of the process up to the time when the hair arrives at the dye vat. But the danger from the infected dust is not limited to those who handle it, nor even to the hair workers of the establishment where infected hair may be received. Infected dust, discharged into the atmosphere outside at the roof of the works, as it sometimes is, may be carried away by the wind, and may produce the specific disease in persons whom it may reach at a greater or less distance from the spot where it is discharged. Evidence of this is furnished in a valuable and scholarly paper by Dr. Russell of Glasgow, appended to Dr. Ballard's report, which gives an account of some cases of anthrax occurring among horsehair workers at the Adelphi Works in Glasgow. Perhaps the most striking example of such an occurrence is

that afforded by the case of a woman who was a fur cutter, and who worked in a building separate from that in which infected horsehair was manipulated, and at a place, distant seventy feet at least from the spot at which the dust, which Dr. Russell believes to have caused the woman's illness, was discharged into the atmosphere. The building was part of and within the curtilage of the establishment; but, so far as the argument is concerned, it might have belonged to an entirely different establishment. Had this been so, it is not unlikely that the origin of the woman's illness would have remained a mystery. The dust, as mere dust, would probably not have been sufficient in quantity to have constituted a nuisance or to have attracted particular notice. But the danger is not limited even to the vicinity of the works where the hair is manipulated. The dust collected in the dusting machine, or in an appropriate chamber, is transmitted sometimes to a distance to dealers in manurial matters.

In a second kind of trade processes, inorganic vapours and gases admittedly poisonous, are given off in quantity, in such a way to produce their special poisonous phenomena; and this sort of influence was found to be manifested in a notable degree outside the works at which the effluvia were given off. This was the case with arsenical vapours given off from galvanizing works, with metallic fumes from the melting up of old brass, and with carbonic oxide gas from lime-kilns.

In these two sorts of offensive business there is some major evil influence, apart from simple offence; but the bulk of Dr. Ballard's report deals with trades and trade processes, in which offence of some kind or another is the prominent feature. In these, several sorts of influence upon health are recognised. There is, first, the influence of stink as stink; an influence found to be common to offensive businesses as such, and independent of the nature of the material or process causing the offence. This influence consists in a group of symptoms of singular constancy, representing a disturbance of digestive and circulating functions along with, and probably due to, a number of sensory disturbances—loss of appetite, nausea, sometimes actual vomiting, sometimes diarrhœa, headache, giddiness, faintness, and a general sense of depression or malaise. The influence is one from which some individuals suffer more than others, and to which some persons become more sensitive, while others become less sensitive, with custom and time. It is one also from which people who from any other cause are sickly are particularly liable to suffer, and even to suffer to a serious degree. Another influence of certain trade effluvia consists in their exerting an acrid irritating effect on the surfaces of the body. The vapours of acids and the products of destructive distillation of oils and fats are types of these effluvia. To workers in factories where they are produced, they are a source of serious distress or discomfort to eyes, throat, and air-tubes, and even to the skin; while to dwellers in the neighbourhood they occasion in a less degree irritation to any exposed mucous membrane.

Of effect upon comfort and ease of life Dr. Ballard has sufficient evidence in the case of a variety of trade processes, but when he comes to consider the evidence respecting further and more serious effects upon health and life, he finds himself in want of the usual means of demonstrating relation between observed disease and the offensive trade as the cause of it. Trade influences proper cannot be differentiated from influences incidental to the place of work, or even from others independent of trade altogether. For example, continued respiration in the neighbourhood of offensive works of an atmosphere moderately charged with sulphuretted hydrogen may be associated with depression of general health, with some nervous disturbance in persons exposed. But other circumstances, such as conditions of lodging and diet, would have to be taken into account before the offensive gas and the failing health could be connected as cause and effect. Though the inquiry could not be extended, so as to take account of these things, suggestions of the reality of such connection were not wanting, even in such limited investigation as was practicable. Of a similar kind was an appearance of injury to health from the offensive effluvia from the tank waste of alkali works, especially where waste acid was permitted to mix with the drainage from the waste. So also the organs of respiration appeared to suffer where acid vapours were largely diffused in the atmosphere, though it was by no means clear that any definite form of disease was produced by those vapours acting by themselves only. About the injury that was done by them to people already subject to chest complaints there was no doubt, and one of the most common observations in the neighbourhood of the numerous works from which acid vapours are given off was the aggravation of suffering experienced by people with delicate chests. Of the popular belief that acid gases have conversely some power for good in preventing infectious disease from spreading within the range of their influence, Dr. Ballard found no evidence whatever. The report teaches, in short, that an offensive business, even though it may not rank in the infective or poisonous class, yet deserves to be regarded as prominent among those conditions that cause one place to be less wholesome than another place.

As regards the second object which was sought to be obtained from Dr. Ballard's inquiry, viz., to learn in what measure and by what means nuisance and injury to health from offensive businesses might be avoided, the report leads to a quite satisfactory result. It shows that by the application of such knowledge as is now at command, all or nearly all businesses that are now in a serious degree offensive may be carried on either without offence or with such important reduction of offence as shall make it tolerable or even trivial. The means of avoiding or lessening offence are fully discussed by Dr. Ballard for the several businesses to which his inquiry has extended, and it is not the least satisfactory feature of his inquiry that 'it is commonly found in practice to be as much to the interest of the manufacturers as of the public that the emanations from offensive processes should be thus arrested.'

We come now to consider the last and most practically important aspect of this valuable and exhaustive inquiry, viz.: the difficulties experienced by local authorities in dealing with offensive businesses. These difficulties fall under three categories. First, there are those which proceed from ignorance of the modes in which trade processes are conducted, of the sources from which offensive effluvia arise in the course of these processes, and of the modes in which the nuisances which are the causes of complaint may be reduced or altogether prevented. It may fairly be hoped that one result of Dr. Ballard's labours will be to dispel some of this ignorance. Secondly, there is a difficulty which sometimes arises from the unwillingness of the Medical Officer of

Health to certify that a trade effluvium complained of is 'injurious to health'. Such unwillingness is practically fatal to any effort to procure the abatement of a nuisance under the powers given to Sanitary Authorities by the Nuisances Removal or Public Health Act. It is quite true that other certificates to the same effect, such as certificates from two medical practitioners, or from ten inhabitants, will legally suffice to move the authority to action; but the awkwardness of an authority acting upon such certificates, under such circumstances, must be obvious when it is considered that their own officer may be compelled to appear for the defence. Many medical officers of health have felt that they could not, with the definition which they themselves put upon the term 'injurious to health', give the requisite certificate. They did not feel themselves justified in certifying that an extensive effluvium was injurious to health, if it merely occasioned such temporary functional disturbances as may be referred to the impression made upon the senses by almost any seriously offensive smell. Dr. Ballard's practice, when he was Medical Officer of Health for Islington, was simply to certify that the offensive place was a 'nuisance, or injurious to health, to the health of the inhabitants of the neighbourhood'; and this seems to us the best way out of the difficulty. The recent decision of the Exchequer Division of the High Court of Justice, in the case of the Malton Local Board, against the Malton Farmers' Manure and Trading Company, to which we called attention on the 15th January last (p. 258), also gives important aid in this connection.

The third class of difficulties arises out of the condition of our legislation upon this subject. *a.* Prior to the passing of the Public Health Act, 1875, the 27th section of the Nuisances Removal Act, 1855, was applicable to the suppression of certain kinds of trade nuisances in any place not without the limits of any populous district. But the Nuisances Removal Act is now only applicable within the Metropolis, and the 114th section of the Public Health Act has operated to deprive the Sanitary Authorities of populous places, not being within the jurisdiction of an Urban Authority, of the power to deal with such nuisances as these, which they could have dealt with formerly. There are many populous places, villages, for example, as large as small towns, and much larger and more populous than many places possessing Urban Sanitary Authorities, which (unless the necessary urban powers are obtained by them) are left to bear this class of nuisances without any legal remedy. *b.* There are trade nuisances, in respect of which most Medical Officers of Health would not hesitate to certify that they are injurious to health, which the Metropolitan Authorities and Urban Sanitary Authorities, acting respectively under the powers given by the Nuisances Removal and Public Health Acts, find a difficulty in dealing with, because they are not *ejusdem generis* with those specially mentioned in the 27th section of the former Act, and the 114th section of the latter Act. Such, for example, are the serious nuisances which arise from the manufacture of super-phosphate manure or sulphate of ammonia, and those which arise from chemical trades generally, except in so far as the effluvium, which is a nuisance, is due to some accumulation or deposit, such as is referred to in section 8 of the Nuisances Removal Act, and section 91 of the Public Health Act. Both Acts specially exempt from their operation those trades which can be defined as a 'smelting of ores or minerals'; the Nuisances Removal Act (section 44) further exempts trades which consist in the 'manufacturing of the produce of such ores and minerals' (an exemption of very wide application), and the Public Health Act (section 334) the 'calcining, puddling, and rolling of iron and other metals'. The exemptions mentioned are, in the case of the Nuisances Removal Act, absolute; but in the case of the Public Health Act the exemptions are not absolute—the Act is not so to be construed 'as to obstruct or interfere with any of such processes respectively'. *c.* Section 113 of the Public Health Act enables any Urban Authority to make bye-laws with respect to offensive trades 'established with their consent', in order to prevent or diminish the noxious or injurious effects thereof. But Urban Authorities have no such power in respect of similar trades, for the establishment of which their consent had neither been required nor obtained. Such power to make bye-laws is useful, if only as being calculated to prevent irritating litigations; and in any proposal for the amendment of the law in respect of offensive trades, it would be worth consideration whether this power of making bye-laws in respect of offensive trades might not be advantageously extended. *d.* Difficulties have in some instances arisen in obtaining convictions for nuisance proceeding from trade accumulations and deposits, in consequence of the operation of the *proviso* in the 8th section of the Nuisances Removal Act, and the 91st section of the Public Health Act. The proviso is as follows: 'A penalty shall not be imposed on any person in respect of any accumulation or deposit necessary for the effectual carrying on any business or manufacture, if it be proved to the satisfaction of the court that the accumulation or deposit has not been kept longer than is necessary for the purposes of the business or manufacture, and that the best available means have been taken for preventing injury thereby to the public health'. This difficulty has chiefly arisen in dealing with accumulations of domestic refuse matters in dust contractors' yards and in brickfields. At dustyards the business consists in separating the accumulated matter into its several elements; and at some seasons the accumulation becomes so large that a long period of time must elapse before it can all be dealt with in this manner, and all this time fresh material is being added, and other fresh accumulations of the matters separated from the original accumulation are being made, each of which fresh accumulations may be as offensive as the original heap. The defence in such cases has been that the original accumulation complained of no longer exists, or that the accumulation has been sifted, etc., as speedily as circumstances permitted. It has been found practically impossible to upset this defence. In brickyards, offensive accumulations of ashes, heated and steaming from the decomposition of the organic débris mixed with them, are still more slowly dealt with in the prosecution of the business. Practically it is found impossible to effectually deal by any process of deodorisation with accumulations which are daily or frequently being disturbed for the purposes of the business. In any new legislation on the subject of trades nuisances, the difficulties to which Dr. Ballard has drawn attention seem to us to be eminently worthy of consideration.

It remains for us only to express the obligations of all sanitarians to Dr. Ballard for his most exhaustive and valuable report. The strain upon the mind involved in the mastery of the details of so many and varied trade processes is in itself of no

small matters; and it is satisfactory to find that the report maintains to the end the clear and perspicuous style in which it was commenced. The complete report is in every way worthy of Dr. Ballard's high reputation, and that of the department of which he is so distinguished a member. Unfortunately, the form in which the several sections of the report have been made public is such as to militate very greatly against its general utility; and we trust that the Local Government Board will see the propriety of at once issuing the whole report in a separate form, and at such a reasonable price, as to bring it fairly within the means of those interested in the matters of which it so ably treats.

UNHEALTHY HOUSES.

By R. H. Barrett.

There is perhaps no one subject more deserving of, and that is destined to receive more earnest attention at the present time, than that of the health-preserving arrangements of dwelling houses—a matter of increasing importance, in direct proportion to increasing population, and consequent crowding of town or urban communities, and in which the various Local Authorities may be truly said to be on their trial. The Urban Authority of Slough, whose new Regulations for house connections will be found at page 442, in endeavouring to meet those modern requirements, were indebted to the districts of Settle in Yorkshire, and Reading in Berks, for some portions of the Regulations they have adopted. It cannot be too widely known that the Public Health Act, 1875, and notably section 21, does give Local Authorities extensive powers which they will do well to put in force. The published articles in the Sanitary Record have undoubtedly given to the reading public much valuable information on those subjects, and an intelligent appreciation of what is required to secure a healthy dwelling, is growing in the mind of the people. At the same time there is no doubt much practical difficulty experienced, by both landlords and tenants, in giving practical effect to what is known to be required. And one of the foremost of those difficulties is that, when a house is purchased or occupied, the purchaser or occupier, as the case may be, is generally, as matters now stand, totally unable to ascertain how far his ideal of a healthy house, as to drainage and ventilation of drains, is realised in the one of which he becomes owner or occupier. But this ought not to be, and a general concurrence of opinion to this effect must necessarily, sooner or later, effect a beneficial alteration in this direction.

It appears to me that two considerations are apparent. First, that the precise ends to be attained, and those to be avoided, should be well understood; and, secondly, that the means of ascertaining whether those ends are attained in every house, or how far they are deficient, should be equally apparent to everyone interested, whether he be a purchaser or merely a casual tenant. The first consideration involves many details, which will vary according to the situation and surroundings of the dwelling in question, and as to these no work in a small compass, so far as the writer is aware, is so comprehensive and at the same time so explicit, and so readily to be understood by the least instructed, as the work of Mr. T. Pridgin Teale, entitled, *Dangers to Health*, where much that is difficult of verbal explanation is taught at a glance by his clever pictorial illustrations. Amongst other suggestions of Mr. Teale, is that of completely severing the sink pipe from the sewer, and causing it to empty itself over a gully in the open air, thus removing one of the most fruitful causes by which sewer gas is ventilated into dwellings. Almost the same may be said of the waste water from the bath, and from the housemaid's sink. These points are dealt with in the Regulations, published at page 442. The other very important consideration is to ascertain how far the house about to be purchased or rented complies with these and other necessary requirements, and it appears to me that this can be attained, and ought to be made compulsory, by the simple plan of making it obligatory upon every person building a house, to cause a complete ground plan of the drainage and ventilation arrangements to be fixed in a conspicuous part of the house. This might be secured, by having it placed in a glazed frame on the inside of the front door, and so constructed that every alteration in the drains could be conveniently delineated upon it by the builder who makes the alteration. If, in addition to this, Local Authorities would make it the duty of their sanitary officer to certify by his signature, the correctness of the plan and of its subsequent alterations, its value would be greatly increased, as thereby landlords and tenants would be able readily to trace and correct defects, which, as matters now stand, their ignorance of the existing drainage arrangements, and the great and uncertain cost of employing builders to trace them out, practically, in nine cases out of ten, precludes them from doing. Inasmuch as a plan of the drains is usually a part of the architect's work connected with every new building, no great hardship would arise from requiring an additional copy to be made for the purpose above indicated. A contributor to the recent interesting correspondence in the *Standard*, confirms the need of such an arrangement by stating that, as proposed head master of a college, he declined to accept the position, because 'no one in authority could tell him the direction of the drains', and he would not undertake the responsibility of accepting the appointment in ignorance of such important information.

The Regulations at p. 442 refer also to precautions necessary to be observed in connection with water-supply, but space forbids more than an allusion to the fact, and a reference to the Regulations themselves, as to that very important subject.

A DICTIONARY OF SANITARY APPLIANCES.

By W. Eassie, C.E.

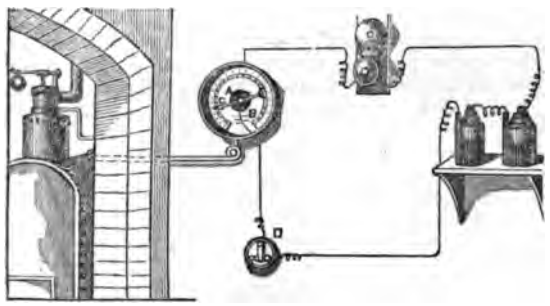
(*Continued from p.* 339.)

AIR.—XXXII.

Temperature Indication.—I have already described several methods of procuring automatic outlet ventilation, and as it is now customary in large establishments to employ steam for various household purposes, and as there is not there the constant supervision afforded in factories and workshops, it may be useful to describe an electrical pressure indicator for indicating maximum and minimum pressures and temperatures. The one I have chosen is the American pattern of Shaw, described in the *Scientific American*.

This arrangement represents a common spring pressure gauge, on the spindle of which is fixed a

crank arm, with a projecting crank pin on its outer end. The glass front of the guage is bored for the reception of a small post, which has double washers on the opposite side of the glass, and to which two other pins are attached. The washers turn upon a central screw in the post, thus enabling the pins to be moved and fixed in any desired position radial with the index. A wire connects the central post with the batteries, passing in the circuit through a switch underneath, and with the bell back to the gauge.



Shaw's Electrical Pressure Indicator.
A, gauge; B, pin, etc.; C, index; D, switch.

The electrical circuit is completed or broken automatically by the rotation of the crank arm, which, coming into contact with the pin, completes the electric circuit, and rings the bell. This bell may be placed at any distance from the instrument, and will indicate the minimum pressure. A reverse movement of the spindle brings the crank arm into contact with the pin, indicating the maximum pressure. An alarm at either extreme signifies that the attention of the attendant is required. The switch is provided to admit of disconnecting the electrical indicator whenever desired. This is found necessary when the device is used in connection with water tanks, reservoirs, etc., to prevent the bell ringing after the proper attention has been given.

Heating, Lighting, and Ventilating Gas-Apparatus. — An apparatus of this kind has been introduced into the market by Mr. Ritchie of London, and attracted considerable attention at the recent Exhibition of Building Appliances at the Agricultural Hall, see page 440. Here the heat produced by the flame is preserved within the apparatus, and the external air being made also, if necessary, to pass through the apparatus as well, it is heated in its passage and discharged into the room. The chief peculiarity, however, of the apparatus lies in the manner of condensing the deleterious vapours arising from the burning of the gas, and their removal in the shape of a liquid. No naked light is exposed, no flue is required, and the amount of light and warmth given off is controllable at will. The stove is also portable, and the mode of lighting is by the ordinary gas-cock arrangement.

As this is a novelty, and has good work to perform, if properly chosen and placed, I will give the fullest description of the patent. A descending pipe or pillar-like column is placed in a room, supporting the light, which is enclosed by a globe or glass chimney. This pillar has an opening at either end, the upper opening coming into a chamber or compartment, the other or lower opening into the room. From the pillar-like pipe projects a chamber or compartment, which is formed to receive the glass chimney, globe, or other lighting arrangements, though in some cases the flame plays without such lamp arrangement direct into the chamber.

On igniting the gas or liquid fuel a certain displacement of the air takes place within the chamber, and by the force thereof the air therein is pushed or impelled through the opening at the lower portion of the pillar-like pipe, and the products follow down. When the light is enclosed by a globe, practically there is formed an unbroken or continuous channel throughout, that is, the heated products rise, firstly, into the projecting chamber, and thence are pushed down through the channel, and the products issue through the opening of the lower portion of the pillar-like pipe. As the vapours descend the column they become cooled, and the products, which are mixed with the vapours, fall with the vapours, and pass off to a greater or lesser degree in the form of a liquid, which is taken away. By these means the atmosphere of a room is protected from the destructive or deleterious vapours at present given off in the usual lighting and heating arrangements. The products of combustion, after issuing from the lower opening of the pillar-like pipe, are sometimes made to return and pass into the room by a return pipe. When found desirable, fresh air, or the air of the room, may be introduced through the pillar for ventilating purposes, the fresh air becoming warmed as it ascends through the apparatus.

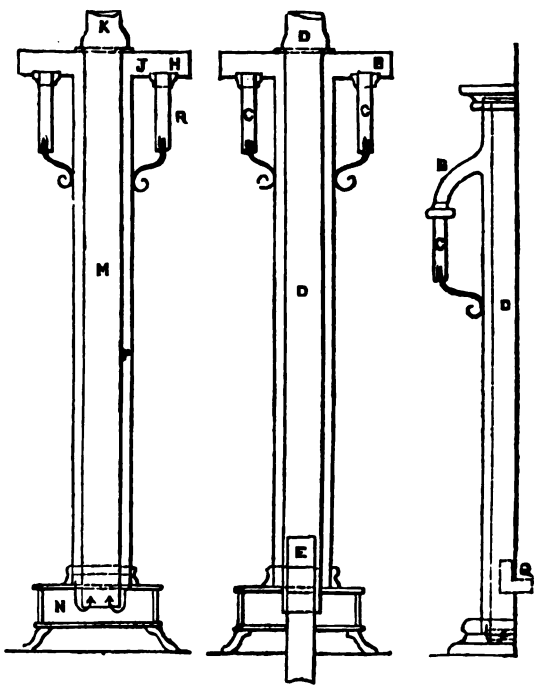


Fig. 1. Fig. 2. Fig. 3.
Ritchie's Gas Lighting, Heating, and Ventilating Apparatus.

In Fig. 1 R denotes the gas burners and the opening where the air enters. The heated products ascend into compartment H, striking the portion of apparatus at J, and causing an upward current in compartment K, to supply which the products are drawn up the space M, through the compartment N, and down the decension pipe P, having travelled from the gas burners at R.

Fig. 2 represents a plain portable stove intended to give light and heat, and also to circulate air in a room. The descension pipe is mounted on a

stand, and has a pipe or chamber, B, projecting from it. A glass globe, C, is fitted into the opening at B, and in it is a gas jet fixed, the support being by a bracket fastened upon the descension pipe.

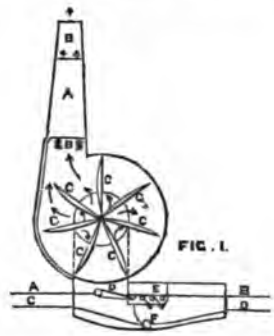
The action of this form of apparatus is as follows. The products of combustion rise from the flame and enter the pipe or chamber, B, and are impelled to the bottom of the descension pipe, and thence they return up by D into the room. E is a pipe or duct by which the air of the room enters to commingle with the said products, or fresh air may issue thereby and thus commingle and circulate in the room. In such case a fresh air supply pipe or tube, E, is led into D through the wall or floor of the room. The pipe, E, is lengthened up, so that there is no commingling of air and products above referred to within the stove, and it should be of sufficient length upwards to maintain the current within it, and to avoid opposition with the currents in D. The products can, if required, be separately led off to the ordinary flue of a room or other place, but they should be well protected from back draught. The deleterious vapours which become condensed as they are impelled through the stove fall to the bottom, and are then received in a suitable vessel or carried off by a small tube.

Fig. 3 shows an arrangement of the Ritchie system, where the form assumes that of a pilaster-like column. This kind is fitted against a wall, and here B represents a pipe projecting from the descension pillar-like pipe, with a glass chimney fitted to it. The products rise into the part B, and are pushed down the descension pipe, and up the return channel. D, situated at the back of the descension pipe. The fresh air inlet is at the foot through the wall, and enters the pipe D.

It is claimed for this arrangement of Messrs. Ritchie & Co. that the escaping gases are so pure that they may be allowed to pass away immediately into a room without danger, and into a greenhouse without causing any destruction among the plants. From experiments made with regard to the heating qualities of the stove pattern, the result was admitted to be very satisfactory. And in respect of the lighting qualities of the lamp patterns it was found that there was a gain, by its adoption, of from 3½ to 5 candles light, the same burner being used, and the same quantity of gas experimented with. Thus far, therefore, the system introduced by Mr. Ritchie may be considered successful.

Air Propeller and Ventilator.—A considerable amount of attention has been directed to a system of ventilation introduced by Messrs. Verity of London, in which the air is impelled forward into the room by mechanical means, and drawn out again by exhaust cowls (See SANITARY RECORD for December 14, 1877, old series). In order to work it, a cistern placed in the highest position in the building in which the apparatus is to be used, and a ⅜-inch lead pipe conveying the water to the machine, is all that is required. The interior mechanism consists of a drum, with a set of fans worked by a fly-wheel placed on the same axis as the fans, which revolve in jewelled centres. The two pin-hole jets of water directed on to the fly-wheel put these fans in rapid motion, and the average rate of air passing through them is 1,000 feet lineal per minute. The apparatus is perfectly under control by turning down the supply valve so that the current of air may be regulated.

The apparatus is described as follows, and it is complete in itself, and fixed in a position where it is in connection with the outer air. The motive power is, as may be seen, hydraulic, and is obtained by the injection of water upon the hydraulic fly-wheel, which, working on the same axle as the rotary fan in the drum, causes the fan to revolve and


B
A
C
C
C

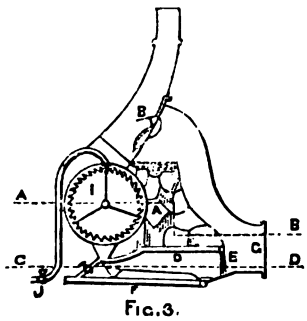
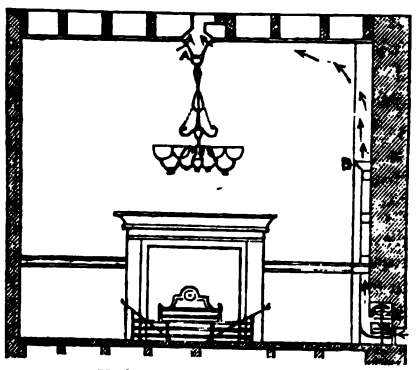


FIG. 3.

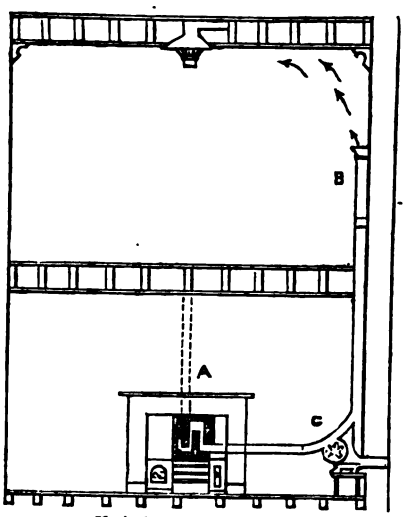
Verity's Charged Air Inlet.

has been cooled by passing over ice, or which has been medicated by being blown over suitable disinfectants. The reservoir for the reception of these extraneous matters is situated at A. The air can also be scented or perfumed in the same manner.

One system of taking in and discharging the air into a room is carried on by means of the air propeller being placed in the wall in communication with the outer air, the outpour of the tube of the



Verity's Room Ventilation.
C, air propeller and inlet; B, delivery from tube on wall.



Verity's Room Ventilation.
A, warm air pipe leading to hall or rooms; C, ventilator, with tube leading to fire clay hot air chamber.

apparatus being connected with a tube and regulator, which is carried some distance up the wall in the ordinary way. The mouthpiece is fitted with a regulator, by means of which the current may be directed upwards at any desired angle. Provision is also made for the reception of a moistened sponge in the tube, and as the incoming air has to pass this it is cleansed of dust. Assuming that it is wise to force the air into a room at all, this system of Messrs. Verity completely attains the object.

THE
SANITARY RECORD.
MAY 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

LOWER THAMES VALLEY MAIN SEWERAGE.

THE Local Government Board is to be congratulated on having a representative in Mr. J. Thornhill Harrison, C.E., who has shown himself capable of conducting, with striking patience, and consideration for all parties, such an intricate and lengthened inquiry as that just terminated on the sewerage of the Lower Thames Valley, with a clear understanding of all the technical points involved in the case.

The object of Mr. Harrison's inquiry is unique in its character. After a carefully considered report, by Colonel Ponsonby Cox, R.E., the Local Government Board issued, on the 5th June 1877, a Provisional Order constituting the present Joint Board, which was confirmed by Act of Parliament on the 10th August 1877. The number of members was fixed at six *ex-officio*, and twenty-six elective members, and the first meeting was held in May 1878, when Mr. (now Sir Thomas James) Nelson, the Chairman of the Hampton Wick Local Board, who had taken the initiative in the formation of the Joint Board, was elected its Chairman. Sir. T. Nelson is the City Solicitor, and being accustomed to parliamentary proceedings, as well as public business generally, he was considered by his colleagues to be pre-eminently capable of guiding the Board in its first proceedings.

The first act of the Joint Board was to offer three prizes of 200 guineas each, to be awarded to the three best schemes for the collection and disposal of the sewage of the combined district. Twenty-five engineers responded to the call, including many of well-known reputation. The whole of the plans, when received, were divided by an independent engineer, Mr. Buchanan, appointed for the purpose, into five classes, viz.:—1. Those advocating total diversion into the sea, which were four in number. 2. Those advocating irrigation, of which there were twelve. 3. Those advocating precipitation and irrigation, of which there were four. 4. Those advocating precipitation and filtration, of which there were three; and, 5. Those advocating precipitation only, of which there were two.

The Board, by a considerable majority, determined to adopt the second mode of disposal—recourse to land—as that which they deemed best for the object in view—and the successful competitors were Mr. Wm. Haywood, Messrs. Bailey Denton and Co., and Mr. James Mansergh.

F F 2

Mr. Haywood selected his land near Moulsey, on the Surrey side of the Thames, and this selection has been the bone of severe contention.

Mr. Bailey Denton, and Mr. Mansergh, are the engineers of Westminster, whose names are well known in connection with sanitary matters. By a somewhat remarkable coincidence they selected the same land at Harmondsworth, on the Middlesex side of the river,—a fact rendered the more striking by the circumstance that this land had been also selected, without their knowledge, by Mr. Shields, C.E., some years back, for the Thames Purification Company, when the power to purchase it by compulsion was, we understand, actually obtained.

In spite of these singularly corroborative facts in favour of the Harmondsworth land, the choice fell upon the plan of the City Engineer, who, in his evidence, admitted, over and over again, that he knew nothing about the preparation of land for sewage treatment, and in face of the fact that, too, Mr. Bailey Denton, whose scheme stood next to that of Mr. Haywood, expressed, we have understood, his willingness to act conjointly with Mr. Mansergh, if, upon closer investigation, the Harmondsworth land should be preferred.

The reasons assigned for the selection of Mr. Haywood's plan were (1) that while the soil was equally suitable on both sides of the river, the Moulsey land was situated 'within' the united district; whereas, that on the Middlesex side was 'without' the district; and (2) that Mr. Haywood's figures were much the lowest—two excellent reasons in themselves if they would bear the test of scrutiny. When the time for taking action came, however, it was found that the land on the Surrey side could not be confined to the parishes within the combined district, and thereby the first reason fell to the ground. After Mr. Haywood's recent evidence before the inspector, in which he stated that his estimate, instead of being £268,000, including land, as stated by Mr. Buchanan in 1878, was £213,946 without it, it would appear that the second reason would share the same fate, for Mr. Ellis, the valuer, put the cost of the land alone at £160,000. Sir Thomas Nelson, the Chairman, too, had stated that the whole cost would be £350,000, from which it is clear that there existed no reliable grounds for declaring the preferred scheme to be the cheapest of those selected for premiums. Having regard, therefore, to the grounds of preference assigned by the committee of selection, in the first instance, we are constrained to declare that justice has not been done, either to the competitors, or to the mode of disposal adopted by the Board. Let us look, however, a little further, and see if the preference is to be justified by any special features in the preferred scheme.

By Mr. Haywood's plan, the whole of the sewage of the combined district is to be taken, contrary to the ordinary rules recognised by drainage engineers, up from Barnes and Isleworth through Richmond, Kingston, and Surbiton, to Moulsey, a distance of upwards of eleven miles and a-half, against the fall of the river. It is, therefore, the more necessary that the views of the engineer of the Board should be distinctly understood, inasmuch as directly he turns his back on the tidal portion of the river, the difficulty of dealing with the sewage, when swollen by sudden rainfall, is greatly increased. It is true that it has been assumed that when once the diluted sewage of the contributory districts has been admitted into the main sewers it will be lifted and cleansed before reaching the river, but this, in practice, will be found impossible at all seasons, let the regulating gauge vary every hour as has been seriously proposed.

If we correctly understand Mr. Haywood's design, it is intended to take the whole of the accumulated sewage of the combined districts, diluted with subsoil and surface waters, by lifts to Moulsey, and after it has reached that terminus, to raise it 46 feet, or, in other words, from a depth at least 30 feet below the river, an operation which would be very simple in itself, if the quantity to be lifted was limited to a known quantity, but which becomes one of a very perplexing character directly the quantity varies with conditions beyond control, such as on the recurrence of heavy rainfall. This is certainly not a favourable feature.

The last length of Mr. Haywood's main sewer from the Ham Pumping Station to the Terminus is 27,280 feet, and it will form, if the expression may be used, a *cul-de-sac*, having an outlet for surplus water at its entrance only; for, with a length of sewer dipped as this will be, no storm overflow could come into action except at its commencement, where the level of the sewer would be nearest to that of the water of the river. This length of sewer is represented by Mr. Haywood as capable of holding three million five hundred thousand gallons, and a single storm occurring in the darkness of the night, and contributing three-fourths of an inch of rain from 200 acres of roofs and paved surfaces—as it readily would, in defiance of the 'clockwork' arrangement suggested by Mr. Baldwin Latham—would more than fill it, should the engines have enough work to do in raising the ordinary flow of sewage. If we assume the engines to be capable of lifting and ready to lift all the liquid coming to the pumps under such circumstances, it is not at all impossible that the aggregate quantity of diluted sewage to be raised in a winter's night on to the farm at Moulsey would, with the present population, reach seven million gallons; and we can hardly believe that the Joint Board has realised the immense difficulties that would attend the distribution of the sewage on any land should such an event occurr. Every practical man conversant with sewage treatment is aware that such a proposition is quite impracticable; for if there were watermen on the ground in sufficient number to guide such a quantity of liquid into its proper place

in the darkness of the night, the crops on the land could not be saved from destruction. No arrangements made over night would provide for such augmentation of flow, which would be greatly increased by the provisions to be made for excesses.

If we turn from this point to Mr. Haywood's figures of the cost of preparing the land, we shall be even more struck with the want of practical knowledge displayed in the scheme so laboriously presented. Mr. Haywood stated in his evidence that the cost of the preparation of his 815 acres to receive the sewage, and the construction of carriers to distribute it, would be £15 12s. per acre, while the cost of the outfall cuts and subsoil drains would reach £14 8s. per acre, making together £30 per acre. Now, without reverting to the figures given by Messrs. Rawlinson and Read, and so often quoted as to the cost of the same sort of work at Merthyr and Kendal, where the outlay has been represented to be more than double what the actual cost has been found to be by Mr. Bailey Denton and other engineers when the expenditure has been under their own control, we are credibly informed that the actual cost per acre of this description of work has been from £70 to £100 an acre. This outlay, it is asserted, is requisite wherever an *even* distribution and absorption of sewage is aimed at, as it should be in all cases, and in none more certainly than on the farm of the Lower Thames Valley Sewerage District. To secure *even* absorption in both surface irrigation, and intermittent downward filtration, the sewage must be evenly distributed, or the same unsatisfactory condition which we read now prevails on the Beddington farm of the Croydon Local Board must be the result. It is, however, of little use now going into these matters; the objections of the advisers of the Crown —declared with a view to protect the royal parks of Claremont and Hampton Court—are fatal to the scheme on the part of the Crown. We believe, however, that Mr. Harrison will have found ample reasons for recommending the Local Government Board to reject Mr. Haywood's scheme without yielding to sentimental objections. One drawback to the selected land, to which we believe the inspector is alive, and to which we can now only shortly refer, is alone sufficient to condemn it. Great efforts have been made by the promoters of the scheme to prove that by under-drainage and open cuts the soil may be so aërated, as to serve for intermittent filtration; but they must have failed to satisfy any close observer in surface geology on this point. It is well known that a great difference exists between the condition of drained soil favourable for vegetation and that required to secure oxidation of putrescible matter. Where there exists subsoil water pressing laterally into a free soil, it is found by experience that no ordinary system of under-drainage will completely keep down the water-level in times of excess, and this is of radical importance.

At Moulsey, and indeed down the whole of the lower valley of the Thames, there is found to be an under-passage of water flowing longitudinally with the main river, which is increased in height by lateral influx, such as the tributary underground waters of the Mole; and on this ground we believe that there is no place in the whole valley of the Thames so inappropriate for intermittent filtration as that selected: in fact we may say after carefully considering the whole of the evidence that no more effectual means of preventing, or of, at any rate, checking, the general application of sewage to land could have been adopted than that purposed by the Joint Board of the London Thames Valley.

WHOLESOME HOUSES.

UNDER the head of 'Wholesome houses', in 1873, there appeared in the *Times* a remarkable series of papers, by experts of varying experiences, in which were detailed the conditions of many of our houses, and how to bring them within the pale of desirable healthiness. During the past few weeks an equally remarkable series of correspondence has been printed in the *Standard*, under the title of 'Unhealthy Houses'; and we cannot help thinking that if iteration can be of service, the readers of our contemporaries must by this time be thoroughly cognizant of the conditions of the essence of jerry-building, and of erections conceived and carried out upon honest principles. It is to be feared, however, that for the most part these letters are simply read and forgotten; or, if cut out and pasted up for reference in a book, the latter is, before long, relegated to the dusty bookshelves — the 'Commons' of literature — and, unlike the 'Lords', with gilded edges and showy backs, is seldom seen in the hands of those whom it was intended to benefit. The rising generation do not seek to peruse them, and ere long another Press appeal to the community becomes necessary in the interests of health and morality.

It is questionable, indeed, whether the lessons of sterling sense, inculcated in letters of the above description, will ever be duly noted, with all our present wealth of correspondence upon a myriad of subjects, until—following the practice of the ancient Babylonians—the sentences are cut incised-fashion in Doulton or Blashfield terra-cotta, and built into the walls of our streets and railway-stations, and where the people most do congregate.

The history of a house, such as those which have aroused the ire of the various correspondents, is simply told. The most eligible ground is purchased, where, in point of fact, the very best houses should have been erected, and, when the ground has been staked out, the foundations are commenced, and afterwards the drains laid down, or rather thrown in, regardless of fall, luting, or due connection with the sewer. It is only after this most important work has been performed, that, as a rule—amongst the class of builders in question—the attention of the foreman, and the builder himself, begins to be concentrated upon what should prove a home, and a healthy

home, for many generations. But this it can never prove to be, for the initial work has been badly performed, and sometimes badly half-performed, and the conduits which ought to have removed the ordinary refuse of the household for ever, perform this function in a lesser degree than it does the office of bringing into the house the baneful disorders born of extraordinary 'horrors accumulate', from that very hot-bed of filth which ought to have been scoured away down a mile of sewers.

Common sense says plainly to all this, where then is the law and its agents, that these things can be done with impunity? How is it that people can possibly find themselves, at the present day, in a perfectly new house, the closet-soil of which descends in an iron rain-water pipe, the head of which is level with the top windows—the sinks of which are connected with the drains with mere apologies for traps, the drinking-water cisterns of which also supply closets, and with waste-pipes leading into the drain? It is very difficult to answer this question, for, as a rule, until some gross mistake has been discovered in a house after it has been inhabited, it is not the duty of the surveyor or inspector to examine these—the vital parts, so to speak, of a residence. All the law demands is a plan of the drains intended to be laid down, with a list of the services, and the fall desired. Its servants do not inspect the work whilst being executed, to see whether the joints are water-tight, or the fall regular; and the consequence is, that not until the house has been occupied for some time, and the sewage has oozed up through the joints of the floor, is the edge of the law brought to the root of the evil. And even then, the delinquent escapes, and at most, has merely to make an abatement in the next quarter's rent, or lose his late tenant.

This is the history of many of the best houses of modern build in London; and scores of noblemen and gentlemen could bear witness to the truth of our allegation. Only a month or two ago, one nobleman had to send his family to the north, until his basement floor was taken up, and new drains laid down; and this in a new house, which has just left the hands of the architect and builder. The truth is, no adequate legislation has dealt with this matter; and, beyond seeing that the walls are of the requisite thickness and so on, the few regulations as to the equipment of the house with perfect drainage, and proper connection with the sewer, are allowed to go to the wall. It becomes serious, however, when no connection of any kind has ever been made with the sewer; and here the vestry surveyor is probably to blame, as it is his duty to have a flap-trap built at the junction of the house-drain with the latter. But, as a surveyor pointed out to a meeting convened some time ago, at the Society of Arts, to consider the health and sewage of towns, it could never be expected for the surveyor to peregrinate the town, examining into the smallest details, nor either is it the duty of his inspectors, seeing that they are engrossed with more general duties.

Let us take, for instance, a house, the bad drainage of which has caused several illnesses, and to which the attention of the Local Authority has been drawn. It may have been intended in the Public Health Act of 1875 for this Authority to open up the basement, examine and make good at its own expense any default laid bare; but such is not the working of the Act, neither could it have been carried out. Surely if a builder be allowed, for want of adequate supervision on the part of the law, to erect an improperly-drained building, it cannot be expected that the ratepayers should make good such negligence. We know a mansion, the drainage of which remained underneath the floor for six months after it became habitable, and where a new drain had to be put in—due to the want of fall, and a dip trap, in the other drain—and where not less than a thousand pounds was expended before it was rendered as it ought to have been at first. The builder declined to put it right, because his work had been certified by the architect, and the latter was hardly amenable, as the errors or deficiencies of work were caused by the laxity of the clerk of works, who, of course, was paid ostensibly by the owner of the house. When this altered work was being carried out, the inspector saw it duly carried out; but certainly the expense of the new drains was not defrayed by the Local Authority. There would have been no equity had the expense been so met, neither could such have surely been the meaning of the framers of the Act.

The only cure for this unpleasant state of things is to disallow the occupation of a house by any tenant or owner until some public servant has declared the residence to be habitable, and to have been properly built. Nor should this inspection be a surface one, but rather a searching one. Every soil-pipe should be tested with smoke or water, and every drain tested for self-cleansing property. And in order to pay such public officers, who should, by the way, be of the grade of civil engineer, each builder, not owner—except he be the builder as well—should deposit in the public office, set apart for this section of parish work, a certain percentage upon the sum to be expended as caution money for the house being properly treated. Should it prove on due examination that the plumbers' work is faulty, or the drains leaky, or no proper junction made with the sewer, then it should be in the power of the officer in question to prepare a specification, and to give the work out to be done, after a competition—the contractor for this work, and the extra labour of the officer as well, to be paid for out of the impounded monies.

It is of no manner of use trusting to the law, such as it is; for, from the Medical Officer of Health down to the Ispector of Nuisances, no one is bound to see everything duly carried out whilst the work is in progress. And clearly, before any tenement is entered upon, the intending tenant should have it duly inspected by a competent engineer, not by a

medical expert only, and refuse to reside in it until shortcomings have been made good. This should be the rule, unfortunately, whether the house be old or new; and, if it become a general practice, an efficient benefit will have been secured, and a legion of complaining letters in our newspapers will not have been written in vain.

NOTES OF THE MONTH.

INSANITARY CONDITIONS AND LOW DEATH-RATES.

Dr. Franklin Parsons has recently presented to the Local Government Board a report on the sanitary condition of Sutton Bridge, a small urban district in Lincolnshire situated on land reclaimed from the Wash, which is curious as showing how every conceivable insanitary condition may exist in conjunction with a low death-rate. The older cottages of Sutton Bridge are very damp, the floors being of brick or stone, and frequently six inches or so below the level of the ground outside. Some of the new houses, though built on a better plan, are scandalous examples of 'jerry building', the external walls being in part only half a brick in thickness, and the mortar being nothing but incoherent dirt, which crumbles into powder between the fingers on the slightest pressure. The greater part of the district is entirely without drainage, the liquid refuse of the houses being thrown either into open ditches, upon the ash-heap, or more generally into large cisterns or cess-pools, with loosely-bricked sides, whence the liquid soaks away into the porous soil. The vault privy is in almost universal use in the place, and of an organised system of scavenging there is none. The water-supply is from wells, which are shallow, and are not puddled, so that the water is drawn from near the surface of the porous bed of silt. Into this bed percolate the foul liquid contents of privy vaults, etc., so that filtration through a few feet of porous sand is relied on to transform foul sewage into potable water. The sanitary administration is naturally of the most defective kind. The Medical Officer of Health is paid at the rate of five shillings (!) for each annual report, and half a guinea for each time that his services are called into requisition by the sanitary authority. Until recently, the foreman of the road labourers, an old man of 70, who could neither read nor write, was supposed to act as Inspector of Nuisances, his wages being eighteen shillings a week. His attention seems only to have been given to cases where complaints were made, and not always to those. A specimen of his advice is given in a case where, to avoid carrying the contents of a privy-vault through the house, a hole was, at his recommendation, dug for them in the narrow, shut-in back garden, where, covered up with ashes, they remain to this day, The local board possess a sufficiently comprehensive code of bye-laws; but their very existence had been forgotten. Yet, notwithstanding these nuisances, the average death-rate (16.8 per 1,000), and the infantile death-rate (11.6 per 1,000 births), are both very low, and infectious diseases are conspicuous by their absence. The district cannot, however, be expected to continue to show a favourable bill of health in future, if it is allowed to grow into a town without any care or supervision over its development; houses being erected without any regard to the principles of health, and the ground being allowed to become saturated with filth, polluting the air and drinking-water. Moreover, in its present condition, Sutton Bridge is calculated to form a most favourable hot-bed for the propagation of those diseases which are spread from household to household by the agency of polluted air and drinking-water. It has fortunately escaped any epidemic of this nature hitherto, but there is no security that this immunity will continue.

NATIONAL HEALTH SOCIETY.

At a lecture given on the 29th inst., on the 'Prevention of the Spread of Fevers', by Mrs. Johnstone, Manager of the Sanitary Aid Association of Hastings, at the Cavendish Rooms, Mortimer Street, a very large audience was assembled, chiefly consisting of clergymen, district visitors, rent collectors, nurses, and others employed in visiting amongst the poor. The Rev. George How, vicar of Bromley, E., was in the chair, and the meeting was addressed by Dr. Humphrey Sandwith, C.B., General Cotton, and others. The chairman remarked that the clergy were anxious to aid and abet in every possible way the admirable work of the National Health Society.

THE MINISTRY OF HEALTH.

In a letter which we publish on another page, a correspondent exposes a fallacy which seems to have obtained very general acceptance, viz.:—that in giving the new President of the Local Government Board a seat in the Cabinet, the Prime Minister has elevated the dignity of that office. As our correspondent points out, Mr. Stansfeld was in the Ministry under the last Liberal *régime*, and Mr. Gladstone has now merely recurred to the arrangement which was in force when he left office. It is absurd to suppose that the mere fact of conferring upon Mr. Dodson Cabinet rank can, of itself, possibly help to a reform of our present shamefully unsystematic and short-sighted sanitary organisation. Mr. Stansfeld's success in this direction, whilst he was in the Cabinet, was not such as to inspire much hopefulness in sanitary reformers from the mere presence of Mr. Dodson in the mystic chamber of Downing Street. If, however, the latter can convince his colleagues of the necessity for the establishment, on a firm and broad basis, of a real Ministry of Health, instead of the inefficient department that now does duty for it, the case will be different. He will then have earned the lasting gratitude of all Sanitarians, and have done more in behalf of the public health of the country (which is its public wealth), than the passing of scores of Acts of Parliament, or the issue of hundreds of official orders could accomplish in a generation.

VACCINATION AND SMALL-POX.

The value of vaccination as a prophylactic against small-pox is evidenced in many remarkable ways; and not the least striking and curious instances of its protective power are given in a report recently published on the sanitary condition of the North-Western Provinces of India, where no less than 58,816 deaths from small-pox were registered in 1878. The difficulties which have to be surmounted in securing vaccination in India are of extraordinary magnitude. Small-pox, unlike other

diseases, has been elevated into the special manifestation of a malignant deity, who is worshipped under the name of 'Sitla'. The remedial agencies that would be suggested in the case of ordinary diseases resolve themselves, in this case, into prayers and offerings of a substantial character to 'Sitla', whose image is represented dressed in red cloths, and sitting on a water-lily. By many it is considered impious to encroach on the province of Sitla with such unholy remedies as English medicines and vaccination, and no persuasion can avail with a very strict Hindu. Even with those who are less inflexible, the task of inducing them to allow vaccination to be performed is a superlatively difficult one. Vaccination is, nevertheless, making substantial headway; and cases such as those recorded beneath are making their impression even upon the sluggish Asiatic intellect. A tribe of infanticide Thakurs, being convinced that evil would accrue from vaccination, refused to submit their sons to the operation, but were easily persuaded by the vaccinator to try the experiment on their female children, in the hope that the latter might be got rid of without the risk of the penalties attaching to a less legitimate mode of death. About a month afterwards, small-pox of a virulent type broke out in the two villages owned by these Thakurs; and, whilst all the daughters escaped, many of the male children, to the grief and astonishment of the parents, fell victims to the disease. Profiting by experience, the boys are now submitted for vaccination, whilst the girls are to a great extent withheld. In another part of the province, five of one family, in an Azamgarh village, were vaccinated, and four concealed from the vaccinator. Subsequently, the latter all died of small-pox, whilst the former escaped from an attack of the disease. In another family one child was vaccinated and two concealed. The latter both died, while the child who was vaccinated escaped. In a third family two were vaccinated and three concealed. The latter were attacked by small-pox in a severe form, the former were not affected. A chaudikar presented one child for vaccination; his wife fled with the other to a field, and this child died of small-pox. These are interesting and striking cases, and they point an obvious moral which anti-vaccinators will do well to ponder.

A NOVEL REASON FOR REDUCTION OF SALARY.

The Axbridge Rural Sanitary Authority, finding that the work of their Inspector of Nuisances, Mr. W. Nicholson, has been diminished in consequence of the improvement which he has effected in the sanitary condition of the district, have proposed to show their appreciation of his efforts by reducing his salary. To this the Local Government Board very properly object, stating that it appears to them 'that an almost necessary consequence of such a course of proceeding would be to discourage the Inspector of Nuisances from in future carrying out with efficiency the measures essential for the maintenance of the improved sanitary condition of the district'. This appears to us quite the right line to take in the matter, and we trust that the Local Government Board will be firm in their refusal to recognise so bad a precedent as the Axbridge Authority desires to set.

AN INFECTIOUS HOSPITAL AT BOURNEMOUTH.

After a considerable amount of negotiation and correspondence, a proposal to erect a hospital for infectious diseases at Bournemouth has received the sanction of the Local Government Board. The official inquiry by Mr. J. T. Harrison, C.E., which preceded the sanction of the Whitehall authorities, seems to have been a very short one, the proceedings lasting only half an hour; but doubtless the inspector was well satisfied of the propriety of granting a provisional order to enable the Authority to take lands compulsorily for the purposes of the hospital. Since the inquiry, an evidently well-intentioned protest against the erection of the building has been made by certain of the Local Improvement Commissioners. The chief objection of these gentlemen is that 'the prosperity of those who are engaged in the mercantile pursuits of the place must greatly depend on its character for salubrity, which would, however unreasonably, be impeached by the fact of the existence of, and therefore the presumed necessity for, a hospital for infectious disorders in the place'. The other objections relate to the healthiness of the town and its freedom from fevers, and need, therefore, no comment from us; but so cardinal a fallacy underlies the remark that we have quoted, that it needs to be exposed. So far from the existence of an infectious hospital in a watering-place being detrimental to its interests, it is in reality one of the first matters that all thinking holiday-seekers inquire about. A town that possesses an infectious hospital, in which can be at once isolated stray cases of disease, that may at any moment be imported from the four quarters of the kingdom, may fairly be supposed to be well equipped in its general sanitary arrangements. On the other hand, a health-resort that neglects to provide itself with so important a sanitary defence, may inferentially be credited with carelessness about the health of the visitors whom it seeks to attract, and upon whom it relies for its prosperity. It is not so very long ago that a seaside town was ruined for an entire season by a widespread outbreak of infectious disease in it, which the possession of a hospital would have enabled the authorities to nip in the bud. In seeking to guard against such a contingency, Bournemouth is acting equally in its own interest and that of its clients; and it is to be regretted that opposition should be offered to so useful a proposal as that now under consideration.

THE SANITARY INSPECTION OF JAILS.

A point of some importance has recently been raised at Chelmsford, with regard to the power of a Medical Officer of Health to require admittance to a prison, when he has reason to believe that infectious disease exists therein. It appears that Dr. Downes, the Medical Officer of Health for the Chelmsford Rural District, hearing of an outbreak of diphtheria in the Springfield County Gaol, sought permission of the Governor to inspect the building, with the view of making a report, and taking measures for preventing the spread of the disease. The Governor declined, however, to admit the medical officer on the ground that he had no power to do so, except by written order of the Prison Commissioners. The Local Authority thereupon applied to the magistrates, under Section 102 of the Public Health Act, for an order requiring the Governor to admit Dr. Downes, but the latter have come to the conclusion that they have no jurisdiction in the matter. The case being thus left in an unsatisfactory position, it may be well to explain what is the actual law upon this particular question. The only Government buildings legally exempt from the provisions of the

Public Health Act, are those vested in the War Office or Admiralty (Section 327). No such exemption exists in favour of property vested in the Home Secretary, or the Commissioners of Prisons; and Section 102 of the Act, enabling a sanitary authority or its officers to be admitted into any premises for the purpose of examining as to the existence of any nuisance therein, applies therefore equally to jails as to ordinary buildings. Whilst, however, a Medical Officer of Health has this legal right of inspecting jails, the policy may be doubted of his attempting to do so without the sanction of the central authorities. Jails differ from all other non-exempted buildings in the country, in being under the direct superintendence of the Home Office; and it was doubtless an unintentional omission, when the Prisons Act was passed, that they were not exempted from inspection by the local authority. If a medical officer of Health considers that the health of his district is likely to be prejudicially affected by anything happening in a prison, or *vice versâ*, it would probably be sufficient if he were to communicate the facts to the Governor. It would be the duty of the latter to inform the Prisons Commissioners of the circumstances; and as there are two Medical men on the staff of that Department (Dr. Briscoe and Mr. R. M. Gover), the necessary remedial measures would no doubt be adopted, without the necessity of further intervention on the part of the local medical officer of health. If this were not the case, the matter might be submitted to the Local Government Board, who would doubtless communicate with the Home Office on the subject.

THE PUBLIC HEALTH
DURING APRIL 1880.

THE temperature during April showed a slight excess; it was above the average, however, on but thirteen of the thirty days in the month. The mean temperature during the month at the Royal Observatory, Greenwich, was 47°.1, and exceeded the average for the corresponding month in 100 years by 1°.1. Rain was measured on sixteen days of the month at Greenwich, to the aggregate amount of 2.2 inches, showing an excess of half an inch upon the average April rainfall in 61 years. The sun was above the horizon during 414.9 hours of the month, and 128.4 hours of bright sunshine were recorded. The amount of sunshine was not equal to that recorded during March, but exceeded the average amount for April. North-easterly winds prevailed during the greater part of the month.

In the twenty large English towns dealt with in the Registrar-General's Weekly Return, containing an estimated population of about seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 22,314 births and 12,583 deaths were registered during the four weeks ending 1st May. The births were equal to an annual rate of 38.8 per 1,000 of the estimated population in the twenty towns; the birth-rate was equal to 38.2 in London, and to 39.2 in the aggregate population of the nineteen provincial towns. The deaths registered in the four weeks of April were equal to an annual rate of 21.9 per 1,000, against 29.0 and 22.3 in the two preceding months. The April death-rates in these towns in 1877, 1878, and 1879 were equal to 25.3, 25.8, and 26.2 per 1,000 respectively. The health of our large towns last month, judged by their mortality statistics, compares favourably with that recorded in recent corresponding periods.

The lowest annual rate of mortality during April in the twenty towns was 15.7 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Leeds, 18.4; Brighton, 18.8; Leicester, 19.0; Bristol, 19.7; Hull, 20.4; Wolverhampton, 20.6; London, 20.8; Bradford, 21.4; Birmingham, 21.8; Sheffield, 22.5; Sunderland, 22.7; Newcastle-upon-Tyne, 23.6; Salford, 23.8; Oldham, 25.5; Norwich, 26.0; Manchester, 26.3; Liverpool, 26.4; Nottingham, 27.0; and the highest rate during the month was 32.3 in Plymouth. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate during April averaged 22.9 per 1,000, while in London the rate did not exceed 20.8. The high death-rates recorded in Norwich, Liverpool, Nottingham, and Plymouth were in great measure due to the fatal prevalence of zymotic disease. In Manchester, however, the excess of mortality does not appear to have been due to this cause.

The 12,583 deaths from all causes in the twenty towns included 1,765 which were referred to the seven principal zymotic diseases; 575 resulted from whooping-cough, 403 from measles, 380 from scarlet fever, 151 from fever (principally enteric), 138 from diarrhœa, 63 from diphtheria, and 55 from small-pox. These 1,765 deaths were equal to an annual rate of 3.1 per 1,000 in the twenty towns during the four weeks under notice, against 3.9 and 3.3 in the two preceding months. In the nineteen provincial towns the zymotic rate was 3.1 per 1,000, corresponding with the rate that prevailed in London. The annual death-rate from these diseases during April did not exceed 1.2 in Brighton, and 1.4 in Leeds and Wolverhampton, whereas it ranged upwards in the other towns to 4.3 in Oldham, 4.4 in Salford, 6.2 in Nottingham, and 14.8 in Plymouth. Whooping-cough was again the most fatal disease in the twenty towns during April, causing 357 deaths in London, and but 218 in the nineteen provincial towns; out of London it showed the largest proportional fatality in Manchester, Salford, and Newcastle-upon-Tyne. Measles continued to show epidemic prevalence and fatality in Plymouth and Nottingham; it caused 110 deaths in London, and no less than 293 in the nineteen provincial towns. The fatality of scarlet fever was much more generally distributed, but showed the largest excess in Manchester, Salford, Sheffield, Newcastle-upon-Tyne, and Sunderland. Of the 151 deaths referred to fever in the twenty towns, only 59 were returned in London, while 92 were recorded in the nineteen other towns. The greatest fatality of fever (almost exclusively enteric) again occurred in Sheffield, where 24 more fatal cases were recorded, showing an average excess upon the weekly numbers recorded during March. In London 44 deaths were referred to diphtheria, while but 19 were returned in the nineteen other towns. Small-pox caused 55 more deaths in London, but not one in any of the nineteen provincial towns. The metropolitan asylum hospitals contained 196 small-pox patients at the end of April, against 80, 163, and 172 at the end of the three preceding months. The weekly number of new cases of small-pox admitted to these hospitals, which had been 20, 50, and 39 in the three preceding months, was 46 during April. The fatality of small-pox in London showed therefore a further increase during last month.

The fatality of diseases of the respiratory organs showed a further considerable decline during April. The weekly number of deaths referred to these diseases in London, which had averaged 932 and 350

in February and March, did not exceed 317 during the four weeks of April, and were equal to an annual rate of 4.5 per 1,000. The death-rate from lung diseases showed the usual wide variations in different towns. In those of the twenty large towns contributing statistics to our table, the annual rate from these diseases, during April, ranged from 4.0 and 4.3 in Bradford and Wolverhampton, to 6.6 and 6.7 respectively in Liverpool and Salford.

In the outer ring of suburban districts around London, (having a population little less than a million persons), the annual death-rate from all causes, during April, did not exceed 16.2, and the zymotic rate was but 2.0 per 1,000. In inner, or registration London, the corresponding rates were, as before stated, equal to 20.8 and 3.1 per 1,000 respectively.

The number of urban sanitary districts for which uniform mortality statistics are given in the accompanying table is 176. In the corresponding tables for the nine preceding months, the number of contributing sanitary districts steadily increased from 36 to 174. On the last day of April, 192 post cards were sent out to the medical officers of health of as many urban sanitary districts, including fifteen new applications. No less than 176 of these cards have been returned, and the statistical information furnished thereon is herewith published.

In one respect, the uniformity of our statistics is not so complete as we could wish it to be. A very large proportion of our monthly statistics are of necessity compiled from weekly returns. In these cases the monthly return must sometimes embrace four, and at other times five weekly returns. In order to secure greater uniformity, it is therefore desirable to repeat the rule, which should be observed in deciding with which month the week in which one month ends, and another begins, should be included. A week should invariably be included with that month to which the greater number of its days belong. For instance, it was necessary to include five weeks in the month of March, because four of the seven days in the week ending 3rd April, belonged to March. Several medical officers of health, however, have included the week ending 3rd April with that month; thus, some of our monthly returns embrace four, and others five weeks, ending 1st May. Medical officers will find, at the end of each monthly bulletin, which is sent with their post-cards, a memorandum, explaining what period the next monthly return should embrace; by observing this instruction, greater uniformity in our returns will be secured in future.

The estimated population of the 176 sanitary districts for which we publish April statistics in the accompanying table, is rather more than seven millions of persons; and, if we include London and its outer ring of suburban districts, it would amount to nearly twelve millions. The annual birth-rate in those districts furnishing this information averaged 38.5 per 1,000, against 35.4 and 36.5 in the two preceding months. Although a monthly return of births for small districts has little value for comparative purposes, it may be noted that the April birth-rate was low, and scarcely exceeded 25 per 1,000, in Weymouth, Richmond, Bath, and Bridport. On the other hand, it was unusually high, and exceeded 50 per 1,000 in Brentford, Ilkeston, Rowley Regis, Runcorn, Smethwick, Warrington, Workington, and Widnes.

The annual death-rate during April averaged 21.6 per 1,000 of the estimated population in the 176 Urban Sanitary Districts; in the four preceding months the average death-rates in the contributing sanitary districts steadily declined from 25.2 to 21.8. In the twenty large towns, including London, the average death-rate during last month was 20.8 per 1,000, and was 0.7 above the average death-rate that prevailed in the smaller Urban Sanitary Districts. The annual death-rates during April were exceptionally low, and under 14 per 1,000, in Banbury, Bromley (Kent), Cambridge, Chelmsford, Finchley, Goole, Guildford, Maidenhead, Sittingbourne, Stourbridge, Torquay, Tredegar, and West Derby. Exceedingly high death-rates—above 30 per 1,000—were recorded last month in Altrincham, Bradford (Lancashire), Camborne, Carnarvon, Leek, Plymouth, Workington, and Worthing. Most of these high rates were due to excessive zymotic fatality; in Worthing, however, the excess appears to have been mainly caused by exceptional mortality among elderly persons.

The annual death-rate from the seven principal zymotic diseases averaged 2.7 per 1,000 in the 176 sanitary districts, against 3.1, 3.0, and 2.8 in the three preceding months; the death-rate from these diseases in the twenty large towns averaged 3.1 per 1,000. In 39 of the 176 sanitary districts no death was referred to any of these seven zymotic diseases. The zymotic death-rate, however, showed a marked excess in Altrincham, Bradford (Lancashire), Carnarvon, Gloucester, Plymouth, and Swansea. Small-pox caused two deaths in Bury and one in Bolton; the epidemic in Bath appears to have ceased, as no death from this cause was registered during April. Measles again showed epidemic prevalence in many of the sanitary districts, specially in Bolton, Cardiff, Carnarvon, Gloucester, Nottingham, Plymouth, and Swansea. Scarlet fever showed excessive fatality in Altrincham, Bradford (Lancashire), Gorton, Middlesborough, and Swansea; and whooping-cough in Altrincham, Camborne, Devonport, and Rochester. The deaths referred to fever, principally enteric, again showed a marked excess in Sheffield; they were also proportionally excessive in Bury, Swansea, and in Bradford (Lancashire).

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 4.7 per 1,000 persons living in the 176 sanitary districts, against rates declining steadily from 7.4 to 4.6 in the four preceding months. Excessive death-rates from these diseases were, however, recorded in many of the smaller towns, and exceeded 7 per 1,000 in Bootle, Bridport, Oxford, Newcastle-under-Lyme, Bradford (Lancashire), Leek, Batley, Runcorn, and Canterbury. Infant mortality, measured by the proportion of deaths under one year to births registered, averaged 141 per 1,000 in the 174 Urban Sanitary Districts; in the twenty large towns the death-rate of infants averaged 139 per 1,900 against 166, and 148 in the two preceding months. In London, infant mortality, which had been equal to 178 and 142 per 1,000 in February and March, further declined to 128 in April. In many of the smaller sanitary districts, however, infant mortality showed a marked excess last month, and the rate exceeded 200 per 1,000 in Altrincham, Batley, Congleton, Consett, Leek, Middleton and Tonge, and Plymouth.

The table of mortality statistics for April includes the following sixteen watering-places or health-resorts:—Bangor, Brighton, Dawlish, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The average annual death-rate, during April, in these sixteen (an increase of two upon the number in the

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF APRIL 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
ABINGDON	6,033	22	10	4	1	1	..	1	3	..	..	..	..	..	..	..	..	2	1	..	..	44.4	20.2	0.0	4.0	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	82	52	15	11	1	3	14	8	1	..	..	1	..	..	..	..	9	6	..	..	33.3	21.1	0.4	3.6	J. Ewart.
ACTON‡	14,000	63	22	8	4	..	..	6	4	1	..	1	..	..	..	..	..	7	1	..	..	58.7	20.5	0.9	6.5	T. Francis.
ALTRINCHAM	12,000	34	29	8	11	1	1	4	4	15	..	1	7	1	6	..	..	2	3	..	3	34.5	29.4	15.2	2.0	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	123	82	24	18	8	2	17	13	24	..	11	7	..	2	2	2	22	12	..	5	44.8	29.9	8.7	2.9	W. H. Hughes.
ASTON MANOR	52,821	186	70	19	13	3	2	19	14	6	..	..	1	1	3	..	1	18	9	2	..	42.8	16.1	1.4	4.1	H. May.
BANBURY	13,500	*	9	2	2	..	..	2	3	1	..	..	1	..	..	..	..	2	1	..	..	*	8.1	0.9	1.8	R. Grimbly.
BANGOR	7,835	*	18	3	4	..	..	4	7	2	..	2	..	..	..	..	..	2	3	..	..	*	28.0	3.1	3.1	H. Rees.
BARNSLEY	30,000	119	55	15	13	*	*	*	14	12	..	1	5	..	3	1	2	14	7	2	5	48.3	22.3	4.9	5.7	M. T. Sadler, M.D. Lond.
BARROW-IN-FURNESS	40,000	128	49	16	12	2	6	8	5	6	..	..	1	..	1	2	2	3	5	2	..	38.9	14.9	1.8	0.9	J. Settle.
BATH	53,649	106	89	14	9	2	5	27	32	1	..	..	..	..	1	..	..	16	6	5	20	25.7	21.6	0.2	3.9	A. B. Brabazon, M.D.
BATLEY	29,851	98	59	25	10	2	3	11	8	5	..	4	..	..	1	..	..	23	5	..	..	39.9	24.0	2.0	9.4	W. Bayldon.
BECCLES	5,000	17	7	1	1	..	..	..	5	..	..	..	..	..	..	..	..	1	..	..	..	41.4	17.0	0.0	2.4	E. B. Crowfoot, M.B.
BILSTON	25,000	*	39	14	6	3	2	9	5	6	..	..	1	..	..	2	3	..	..	..	..	*	16.3	2.5	0.0	W. M. Hancox.
BINGLEY	9,000	22	15	4	2	1	2	2	4	3	..	2	..	..	..	..	1	4	2	..	..	29.7	20.3	4.1	5.4	J. W. Craig, M.D.
BIRMINGHAM‡	394,738	1312	649	180	127	20	29	170	123	53	..	2	10	3	13	9	16	161	45	22	77	43.3	21.4	1.8	5.3	A. Hill, M.D.
BISLEY	5,240	8	9	2	3	..	..	3	1	..	..	..	..	..	..	..	..	5	1	..	..	18.6	20.9	0.0	11.6	T. Partridge.
BOLTON‡	106,500	326	170	58	34	11	5	37	25	41	1	20	9	..	4	2	5	36	14	3	1	39.9	20.8	5.0	4.4	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	51	7	25	1	2	11	5	11	..	6	..	..	5	..	..	16	2	2	2	*	23.4	5.1	7.3	R. J. Sprakeling.
BOSTON‡	15,000	48	19	4	1	2	1	4	7	..	..	..	..	..	..	..	..	3	5	..	2	41.7	16.5	0.0	2.6	W. Clegg.
BRADFORD (LANC.)†	15,000	68	52	10	24	3	..	13	2	15	..	4	7	..	..	4	..	12	3	2	..	47.3	36.2	10.4	8.3	J. Hudson.
BRADFORD (YORKS.)‡	197,196	513	323	87	68	13	23	73	59	40	..	19	5	1	8	1	6	72	36	7	18	33.9	21.4	2.3	4.0	H. Butterfield.
BRAINTREE	5,000	10	4	..	..	..	..	1	3	..	..	..	..	..	..	..	..	2	..	..	..	24.3	9.7	0.0	4.9	J. Harrison.
BRENTFORD	11,557	55	14	7	4	..	1	..	2	1	..	..	..	..	1	..	..	4	1	..	..	57.9	14.7	1.1	4.2	J. Williams.
BRIDGNORTH	6,000	11	8	2	..	..	..	2	4	1	..	..	..	..	..	..	1	..	1	..	..	22.3	16.2	2.0	0.0	A. Mathias.
BRIDGWATER	13,000	52	26	9	2	..	1	7	7	1	..	..	..	..	..	..	1	..	1	..	5	48.7	24.3	0.9	0.0	F. J. C. Parsons.
BRIDPORT	8,145	18	11	3	..	..	..	3	5	..	..	..	..	..	..	..	..	5	..	..	2	26.9	16.4	0.0	7.5	G. M. Evans.
BRIGHTON‡	107,321	284	155	35	*	*	*	*	37	10	..	1	6	..	3	..	..	*	*	3	21	34.5	18.8	1.2	*	R. P. B. Taaffe, M.D.
BROMLEY (KENT)‡	14,293	32	9	2	3	..	..	2	2	2	..	1	1	..	..	..	..	1	1	..	..	29.2	8.2	1.8	0.9	C. O. Baylis, M.D.
BRISTOL‡	213,536	634	322	68	*	*	*	*	96	46	..	8	15	1	11	6	5	*	*	4	49	38.7	19.7	2.8	*	D. Davies.
BROMSGROVE	6,967	24	15	2	..	2	..	4	7	..	..	..	..	..	..	..	..	2	3	..	5	41.9	26.2	0.0	3.5	C. Carey.
BURNLEY	56,000	*	82	25	19	5	2	19	12	8	..	..	1	..	5	..	2	29	4	1	..	*	17.8	1.7	6.3	T. Dean, M.D.
BURSLEM	29,159	86	42	17	4	..	1	13	7	2	..	..	..	..	1	1	..	9	3	..	..	35.9	17.5	0.8	3.8	J. M. Taylor.
BURTON-UPON-TRENT	33,000	151	54	16	6	3	2	17	10	2	..	..	2	..	..	..	..	14	7	2	5	55.7	19.9	0.7	5.2	C. Perks.
BURY†	50,000	180	123	32	25	*	*	*	17	15	2	1	..	1	5	6	..	25	8	2	8	37.5	25.7	3.1	2.5	H. Ashworth.
BURY ST. EDMUNDS	15,600	47	30	6	4	1	2	10	7	..	..	..	..	..	..	..	..	6	5	..	1	36.7	23.4	0.0	4.7	F. W. Clarke.
CAMBORNE	15,000	*	37	8	11	1	1	3	13	9	..	..	..	..	8	1	..	8	2	..	..	*	30.0	7.3	6.5	E. S. Angove.
CAMBRIDGE	34,500	94	33	6	5	2	1	7	12	4	..	1	..	..	3	..	..	6	3	..	4	33.1	11.6	1.4	2.1	B. Anningson, M.D.
CANTERBURY†	20,962	54	35	8	4	1	..	13	9	..	..	..	..	..	..	..	..	19	9	..	12	33.6	21.8	0.0	11.8	F. Wacher.
CARDIFF	82,364	271	140	35	24	8	17	39	17	26	..	15	..	..	7	1	3	29	19	6	21	40.0	20.7	3.8	4.3	H. J. Paine, M.D.
CARNARVON	10,407	30	28	2	8	1	3	7	7	8	..	7	..	..	..	1	..	3	7	..	..	35.1	32.7	9.4	3.5	H. Rees.
CHELMSFORD	9,700	23	6	2	2	..	..	1	1	3	..	2	..	..	..	..	1	..	..	..	1	28.9	7.5	3.8	0.0	E. H. Carter.
CHELTENHAM‡	45,000	101	77	9	7	1	4	26	30	..	..	..	..	..	..	..	..	22	8	..	11	27.3	20.8	0.0	5.9	T. Wright, M.D.
CHISWICK	12,000	42	18	5	3	..	1	2	7	1	..	..	..	..	..	1	..	4	..	..	..	42.6	18.3	1.0	4.1	F. C. Dodsworth.
CIRENCESTER	7,500	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	F. T. Bond, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF APRIL 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
CLECKHEATON	9,250	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	H. O. Steele.
COCKERMOUTH	5,550	17	9	2	..	..	..	4	3	..	..	..	..	..	..	..	..	4	1	..	4	37.3	19.7	0.0	8.8	J. Ward, M.D.
COLCHESTER	28,633	75	57	9	7	4	3	18	16	7	..	5	..	..	1	1	..	8	9	4	14	31.9	24.2	3.0	3.4	E. Waylen.
CONGLETON‡	12,000	38	29	9	3	2	..	8	7	1	..	..	..	..	..	..	1	5	3	..	..	33.0	25.2	0.9	4.3	P. M. Davidson.
CONSETT	7,757	33	14	8	2	..	..	3	1	1	..	1	..	..	..	..	..	2	2	..	..	51.7	21.9	1.6	3.1	W. M. Renton, M.D.
COSELEY	23,000	70	36	10	6	4	3	7	6	5	..	2	..	..	..	..	3	6	4	..	..	37.0	19.0	2.6	3.2	J. Eagleton.
COVENTRY†	41,000	115	65	17	8	2	3	11	24	9	..	..	2	..	1	..	6	16	5	1	4	36.6	20.7	2.9	5.1	M. A. Fenton, M.D.
COWPEN	5,000	16	7	1	2	1	..	3	..	2	..	..	1	..	1	..	..	1	2	..	..	38.9	17.0	4.9	2.4	H. D. Ward, M.D.
CROMPTON†	8,500	22	14	3	3	1	1	5	1	2	..	1	..	..	..	1	..	..	2	..	..	33.7	21.5	3.1	0.0	W. Brooke, M.D.
CROYDON	70,000	231	115	27	13	11	4	25	35	15	..	1	5	3	3	1	2	23	11	5	16	40.2	20.0	2.6	4.0	C. W. Philpot, M.D., B.Sc.
DARTFORD	9,531	37	18	5	2	..	..	4	7	..	..	..	..	..	..	..	..	5	..	..	..	47.3	23.0	0.0	6.4	E. Moore.
DAWLISH	3,838	*	5	1	..	..	..	2	2	..	..	..	..	..	..	..	..	1	..	..	..	*	15.9	0.0	3.2	L. Armstrong.
DERBY‡	80,385	310	144	49	18	7	7	25	38	6	..	6	..	..	..	..	..	18	11	4	15	40.2	18.7	0.8	2.3	W. Iliffe.
DEVONPORT	50,000	143	76	14	18	4	4	18	18	21	..	9	2	..	10	..	..	8	7	..	4	34.8	18.5	5.1	1.9	J. May, jun.
DORCHESTER	7,500	16	7	2	1	..	..	1	3	..	..	..	..	..	..	..	..	2	..	..	1	26.0	11.4	0.0	3.2	E. J. Day.
DOVER	33,636	93	37	12	5	2	2	4	12	2	..	2	..	..	..	..	..	6	3	..	9	33.6	13.4	0.7	2.2	M. K. Robinson, M.D.
DROITWICH	3,600	7	4	1	..	..	..	1	2	..	..	..	..	..	..	..	..	1	..	..	..	23.6	13.5	0.0	3.4	H. Swete, M.D.
DROYLSDEN	8,000	23	16	3	6	1	..	3	3	2	..	..	1	..	..	..	1	3	..	..	..	35.0	24.3	3.0	4.6	R. Slater.
EASTBOURNE	18,000	*	26	3	3	2	2	4	12	..	..	..	..	..	..	..	..	3	7	..	2	*	17.6	0.0	2.0	E. F. Fussell, M.B.
EAST DEREHAM	5,791	15	11	2	1	..	1	4	3	..	..	..	..	..	..	..	..	4	4	..	..	31.5	23.1	0.0	8.4	H. B. Vincent.
EPSOM†	7,550	*	7	2	..	..	..	3	2	..	..	..	..	..	..	..	..	..	1	1	1	*	12.1	0.0	0.0	E. L. Jacob.
FAILSWORTH‡	8,000	*	16	6	3	1	..	3	3	5	..	4	1	..	..	..	..	2	1	2	..	*	20.9	6.5	2.6	G. W. Beattie, M.D.
FENTON	14,000	63	28	12	5	3	1	5	2	1	..	1	..	..	..	..	..	4	3	..	..	54.7	24.3	0.9	3.5	A. V. Griffiths.
FINCHLEY‡	11,339	23	9	3	1	1	..	3	1	1	..	..	..	..	..	..	1	1	..	1	..	26.4	10.3	1.1	1.1	J. Turle, M.D.
GLOSSOP	18,697	51	37	5	2	5	2	8	15	2	..	..	2	..	..	..	..	7	7	1	..	33.2	24.1	1.3	4.6	J. Rhodes.
GLOUCESTER	37,907	110	80	13	23	11	6	13	14	23	..	18	..	1	2	1	1	16	5	1	7	35.3	25.7	7.4	5.1	J. P. Wilton.
GOOLE	10,205	29	11	6	1	1	..	2	1	..	..	..	..	..	..	..	..	3	1	..	1	34.6	13.1	0.0	3.6	J. Mitchell Wilson, M.B.
GORTON‡	32,000	131	70	17	21	9	..	20	3	16	..	1	14	..	..	1	..	14	10	..	..	42.7	22.8	5.2	4.6	R. E. Hammond.
GREAT DRIFFIELD	6,033	30	9	5	2	..	..	2	4	4	..	4	..	..	..	..	..	1	..	..	..	60.5	18.1	8.1	2.0	D. Ridpath, M.D.
GUILDFORD	10,167	27	11	4	2	..	..	2	3	1	..	..	..	1	..	..	..	..	2	..	..	32.3	13.2	1.2	0.0	J. Morton, M.D.
HALIFAX†	72,000	178	127	21	14	*	*	*	32	4	..	1	2	..	..	1	..	31	10	5	13	32.2	23.0	0.6	5.6	D. Ainley.
HARBORNE	6,000	16	6	1	..	..	..	1	4	..	..	..	..	..	..	..	..	..	1	..	3	38.5	12.2	0.0	0.0	R. W. Smith, M.D.
HEYWOOD	23,000	*	41	13	1	1	5	11	10	4	..	..	2	..	..	1	1	9	4	..	..	*	21.7	2.1	4.8	H. Wisken.
HINCKLEY	7,500	23	10	2	..	2	..	1	5	..	..	..	..	..	..	..	..	..	1	..	..	37.3	16.2	0.0	0.0	W. H. Griffiths.
HORWICH	4,315	12	2	1	..	..	..	..	1	1	..	..	..	..	..	1	..	..	..	..	..	33.8	5.6	2.8	0.0	G. H. Whitaker.
HUDDERSFIELD†	81,780	199	117	23	22	4	8	33	27	8	..	3	2	1	..	2	..	24	16	4	7	31.7	18.6	1.3	3.8	J. S. Cameron, M.D., B.Sc.
HULL‡	149,627	475	234	69	*	*	*	*	49	39	..	18	6	..	5	6	4	*	*	3	20	41.4	20.4	3.4	*	J. F. Holden.
HYDE	28,149	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	J. Nield Cooper.
ILFRACOMBE	5,500	7	11	2	1	1	..	3	4	1	..	..	1	..	..	..	..	2	2	1	..	15.5	24.3	2.2	4.4	E. J. Slade-King, M.D., S.Sc.C.
ILKESTON	12,356	60	18	4	6	..	3	3	2	5	..	4	..	..	..	1	..	5	..	..	..	59.1	17.7	4.9	4.9	R. Wood.
IPSWICH	47,414	120	77	19	7	*	*	*	25	4	..	..	..	2	..	1	1	17	13	1	4	30.8	19.8	1.0	4.4	G. S. Elliston.
KEIGHLEY	24,000	78	48	13	9	1	7	10	8	6	..	..	2	..	3	1	..	12	4	3	3	39.5	24.3	3.0	6.1	A. Roberts.
LEAMINGTON	24,500	59	35	4	3	1	1	10	16	2	..	..	2	..	..	..	..	8	4	1	..	29.3	17.4	1.0	4.0	J. S. Baly.
LEEDS‡	318,929	1000	450	120	*	*	*	*	94	35	..	5	7	..	8	4	11	*	*	16	43	40.9	18.4	1.4	*	G. Goldie.
LEEK	12,527	32	34	11	6	1	2	7	7	3	..	2	1	..	..	..	..	9	4	..	4	31.1	33.0	2.9	8.7	J. J. Ritchie.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF APRIL 1880—(*Continued.*)

Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards.	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Leicester	129,912	389	189	60	*	*	*	*	31	28	..	8	8	2	3	3	4	*	*	4	14	39.1	19.0	2.8	*	W. Johnston, M.D.
Leigh	20,400	69	37	5	7	3	5	12	5	4	..	..	4	..	..	..	..	9	4	1	..	41.1	22.1	2.4	5.4	J. Hall.
Lichfield	8 129	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. A. Carter, M.D.
Lincoln	2,103	108	66	14	13	2	7	17	13	1	..	..	..	..	..	1	..	13	11	1	6	40.9	25.0	0.4	4.9	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,600	14	7	1	..	1	..	2	3	..	..	..	..	..	..	..	..	..	..	1	1	42.6	21.3	0.0	0.0	C. Kelly, M.D.
Liverpool†	44,056	1677	1100	272	235	70	45	294	184	125	..	37	13	4	51	9	11	276	109	53	183	40.2	26.4	3.0	6.6	J. S. Taylor, M.D.
Liversedge	13,750	42	26	6	7	2	1	5	5	3	..	1	..	..	..	..	2	4	1	..	..	37.2	23.0	2.7	3.5	W. J. Sykes, M.D.
Luton	24,200	70	39	10	9	1	1	5	13	2	..	..	..	..	1	1	..	13	4	..	4	35.2	19.6	1.0	6.5	H. Sworder.
Lytham	5,000	11	6	..	..	..	..	3	3	..	..	..	..	..	..	..	..	1	..	..	..	26.8	14.6	0.0	2.4	W. E. Pountney, M.B.
Macclesfield	36,641	86	82	14	12	2	7	29	18	1	..	..	1	..	..	..	..	14	13	..	16	28.6	27.2	0.3	4.6	G. Bland.
Maidenhead	8,281	20	9	..	1	1	1	3	3	2	..	..	1	..	..	1	..	3	1	..	4	29.4	13.2	2.9	4.4	W. T. G. Woodforde, M.D.
Maidstone†	29,537	75	49	9	6	1	1	14	18	4	..	1	1	..	..	1	1	9	5	..	..	33.1	21.6	1.8	4.0	M. A. Adams.
Manchester†	363,130	1064	731	169	*	*	*	*	111	99	..	17	25	1	38	3	15	*	*	13	133	38.2	26.3	3.6	*	J. Leigh.
Merthyr Tydfil	52,000	143	105	26	12	5	10	25	27	5	..	2	..	1	2	..	..	26	10	1	2	33.5	24.6	1.2	6.1	T. J. Dyke.
Middlesbrough	58,988	188	85	26	7	13	4	16	19	16	..	..	12	1	..	2	1	18	7	..	4	38.8	17.5	3.3	3.7	J. A. Malcomson, M.D.
Middleton and Tonge	16,700	36	36	10	8	2	2	5	9	2	..	..	1	..	1	..	..	3	2	1	..	26.2	26.2	1.5	2.2	T. B. Knott.
Morley	12,100	50	12	2	5	..	1	3	1	1	..	..	1	..	..	..	..	1	..	..	..	50.3	12.1	1.0	1.0	S. T. Steele.
Neath	12,000	30	17	2	..	2	..	5	8	..	..	..	..	..	..	..	..	3	5	..	5	30.4	17.2	0.0	3.0	G. Ryding, M.D.
Newark†	13,746	40	19	3	3	1	..	5	7	3	..	1	1	..	..	1	..	6	4	..	1	38.0	18.0	2.8	5.7	A. Ashby, M.B.
Newbury	9,796	26	16	3	2	1	2	1	7	1	..	..	..	..	1	..	..	6	1	..	2	32.3	19.9	1.2	7.5	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	*	30	9	5	1	..	9	6	1	..	1	..	..	..	..	..	11	5	..	..	*	20.3	0.7	7.4	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	434	271	68	58	*	*	*	35	33	..	..	14	..	15	..	4	48	31	11	32	37.9	23.7	2.9	4.2	H. E. Armstrong.
Norwich†	85,827	262	171	45	*	*	*	*	45	23	..	1	11	..	7	1	3	*	*	4	15	39.8	26.0	3.5	*	T. W. Crosse.
Nottingham	173,627	673	403	108	113	18	13	86	65	88	..	58	16	1	5	5	3	72	31	7	25	38.2	28.2	6.2	5.0	E. Seaton, M.D.
Nuneaton	7,400	31	19	8	1	2	..	1	7	2	..	..	..	..	1	..	1	2	..	..	..	51.0	31.3	3.3	3.3	E. Peacock.
Oldham‡	115,413	301	293	89	69	16	20	61	38	48	..	24	2	1	14	3	4	91	28	5	21	33.9	26.4	4.3	8.2	J. M. Sutton, M.D.
Oxford†	37,500	105	76	18	16	3	3	17	19	5	..	1	2	..	..	..	2	22	5	1	9	36.5	26.4	1.7	7.6	A. Winkfield.
Pembroke	15,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	D. P. Saer.
Penzance	12,000	35	19	6	2	1	2	3	4	2	..	..	..	..	..	2	..	3	1	2	..	35.5	19.3	2.0	3.0	G. B. Millett.
Peterborough†	22,000	82	34	7	4	2	..	13	8	6	..	3	..	..	..	2	1	9	2	1	..	48.6	20.1	3.6	5.3	W. Thomson, M.D.
Plymouth†	74,993	200	186	49	81	11	2	19	24	85	..	73	1	..	7	1	3	24	5	1	19	34.8	32.3	14.8	4.2	H. Greenway.
Poole	11,530	30	15	5	1	..	1	3	5	..	..	..	..	..	..	..	..	6	..	..	4	31.6	15.8	0.0	6.3	H. A. Lawton.
Portsmouth†	134,224	334	162	34	*	*	*	*	34	18	..	10	..	..	1	5	2	*	*	4	23	32.5	15.7	1.7	*	G. Turner.
Preston†	88,000	274	172	47	33	12	7	45	28	13	..	..	4	2	1	..	6	46	17	5	4	40.6	25.5	1.9	6.8	H. O. Pilkington.
Ramsgate†	22,200	60	29	5	4	..	1	8	11	4	..	..	2	..	1	..	1	5	3	..	1	35.2	17.0	2.4	2.9	J. W. Barry.
Reading†	41,500	136	57	17	9	4	7	14	6	5	..	..	..	..	4	..	1	11	10	2	6	42.7	17.9	1.6	3.5	J. Shea, M.D.
Redditch	10,070	36	12	3	1	1	..	4	3	1	..	..	..	..	..	..	1	3	..	..	..	43.5	14.5	1.2	3.0	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	28	13	2	5	1	..	1	4	6	..	..	2	..	4	..	..	2	..	..	..	35.9	19.2	7.7	2.6	J. S. Hichens.
Reigate	18,000	50	27	9	4	1	1	5	7	..	..	..	..	..	..	..	..	8	1	..	..	33.8	18.3	0.0	5.4	E. L. Jacob.
Richmond (Surrey)	19,500	41	30	2	6	2	2	11	7	7	..	..	2	..	3	2	..	9	4	1	5	25.6	18.7	4.4	5.6	J. T. Rowland, M.D.
Rochdale	72,000	172	137	35	35	6	6	33	22	16	..	4	2	1	6	2	1	30	10	2	1	29.1	23.1	2.7	5.1	J. Henry, M.D.
Rochester	18,500	68	41	5	11	3	4	9	9	8	..	..	..	..	8	..	..	10	6	..	5	44.7	27.0	5.3	6.6	J. Sladen-Knight, M.D.
Romsey	4,481	22	6	3	..	1	..	1	1	..	..	..	..	..	..	..	..	1	..	..	..	59.8	16.3	0.0	2.7	F. Buckell.
Rotherham	34,404	113	40	11	5	5	2	9	8	2	..	..	1	1	..	..	..	*	*	..	3	40.0	14.1	0.7	*	J. Hardwicke, M.D.
Rowley Regis	27,000	123	33	13	7	1	2	6	4	4	..	2	..	..	..	..	2	7	2	2	..	55.4	14.9	1.8	3.2	J. G. Beasley.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF APRIL 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions	Annual rate per 1000 Persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Rugby	8,916	21	11	1	2	..	..	4	4	1	..	..	..	..	1	..	..	..	1	..	2	28.6	15.0	1.4	0.0	G. Wilson, M.D.
Runcorn	14,000	63	30	6	2	1	2	15	4	2	..	..	..	..	1	1	..	11	4	3	..	54.7	26.1	1.7	9.6	R. H. Mouritz.
Rusholme†	12,500	26	8	2	1	..	..	2	3	..	..	..	..	..	..	..	..	2	..	2	..	27.1	8.3	0.0	2.1	J. Gregory.
Ryde	12,800	*	17	6	..	..	1	6	4	2	..	..	..	..	..	1	1	4	2	2	4	*	16.2	1.9	3.8	A. Platt Wilks, M.B.
Salford†	185,786	583	339	84	82	21	12	88	52	62	..	13	21	2	16	6	4	96	40	8	46	40.9	23.8	4.4	6.7	J. Tatham, M.D., S.Sc.C.Camb.
Selby	6,195	26	9	2	..	..	..	3	4	..	..	..	..	..	..	..	..	2	1	..	..	51.1	17.7	0.0	3.9	J. Mitchell Wilson, M.B.
Sheffield‡	304,938	1105	645	147	140	*	*	*	136	98	..	9	38	..	16	27	8	153	55	13	66	37.8	22.1	3.4	5.2	T. W. Hime, B.A., M.B.
Sittingbourne†	9,000	17	8	1	..	..	1	3	3	..	..	..	..	..	..	..	..	..	..	1	..	24.6	11.6	0.0	0.0	H. G. Sutton.
Smethwick	21,000	101	50	20	5	2	..	16	7	4	..	..	2	..	..	..	2	9	2	..	..	58.5	29.0	2.3	5.2	W. Sutton.
Southport§	34,100	92	66	11	9	2	2	25	17	3	..	..	..	..	3	..	..	13	7	1	2	32.8	23.5	1.1	4.6	H. H. Vernon, M.D.
Stalybridge	23,405	62	43	12	5	4	..	10	12	6	..	..	..	..	2	2	2	13	2	..	..	32.2	22.3	3.1	6.8	F. J. Roberts-Dudley.
Stourbridge	9,376	29	9	2	2	..	..	4	1	..	..	..	..	..	..	..	..	2	2	..	..	37.6	11.7	0.0	2.6	R. S. T. Eagar, M.D.
Stratford-on-Avon	7,899	*	10	..	1	..	..	3	6	..	..	..	..	..	..	..	..	1	1	1	2	*	15.4	0.0	1.5	G. H. Fosbroke, S. Sc. C. Camb.
Stroud	7,665	34	13	6	..	..	..	6	1	2	..	..	..	..	..	..	2	..	2	..	4	52.2	20.0	3.1	0.0	T. Partridge.
Sunderland†	116,730	356	203	40	*	*	*	*	38	32	..	9	12	..	3	5	3	*	*	6	27	39.8	22.7	3.6	*	H. J. Yeld, M.D.
Swansea	65,890	189	167	44	55	19	8	24	17	71	..	48	20	..	..	2	1	25	9	2	5	34.9	30.8	13.1	4.6	E. Davies.
Swinton	7,753	36	14	2	3	..	3	3	3	1	..	1	..	..	..	..	..	2	3	2	..	56.5	21.8	1.6	3.1	C. S. Blythman, M.B.
Tamworth	4,846	17	7	3	..	..	..	2	2	..	..	..	..	..	..	..	..	2	1	..	..	42.7	17.6	0.0	5.0	H. J. Fausset, M.D.
Taunton	16,227	52	33	7	2	3	..	7	14	1	..	..	..	..	..	..	1	9	1	..	4	39.0	24.7	0.7	6.7	H. J. Alford, M.D.
Teignmouth	7,000	14	13	1	1	1	..	5	5	1	..	..	..	..	..	1	..	3	2	..	..	24.3	22.6	1.7	5.2	W. C. Lake, M.D.
Tewkesbury	5,500	14	10	5	..	..	..	3	2	..	..	..	..	..	..	..	..	1	1	..	3	31.0	22.1	0.0	2.2	W. Allard.
Tiverton	10,500	28	15	3	4	..	1	3	4	..	..	..	..	..	..	..	..	3	2	..	2	34.8	18.6	0.0	3.7	J. P. McNeill, M.D.
Torquay‡	26,000	*	33	9	5	..	3	7	9	2	..	..	..	..	1	1	..	6	5	1	..	*	13.2	0.8	2.4	P. Q. Karkeek.
Tottenham‡	37,000	135	51	10	6	6	3	15	11	6	..	..	..	4	1	1	..	8	6	1	1	38.0	14.4	1.7	2.3	C. T. Conolly.
Toxteth Park	8,000	22	7	2	1	..	..	2	2	..	..	..	..	..	..	..	..	3	1	..	..	33.4	10.6	0.0	4.6	R. W. Pendleton.
Tredegar	18,000	55	20	2	2	3	..	4	9	2	..	..	2	..	..	..	..	6	..	..	4	37.2	13.5	1.4	4.1	G. A. Brown.
Trowbridge	12,000	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	G. C. Tayler, M.D.
Truro	11,000	25	13	3	3	1	..	2	4	2	..	..	..	..	2	..	..	3	..	..	..	27.7	14.4	2.2	3.3	E. Sharp.
Tunstall	15,500	44	19	5	1	1	..	7	5	..	..	..	..	..	..	..	..	4	4	..	..	29.6	12.8	0.0	2.7	J. P. Edwards.
Ulverston	11,000	34	14	3	1	2	1	3	4	..	..	..	..	..	..	..	..	3	1	..	..	37.6	15.5	0.0	3.3	A. Thompson, M.D.
Walker-on-Tyne	8,000	30	17	4	3	3	..	6	1	2	..	..	1	..	1	..	..	4	1	1	1	45.6	25.8	3.0	6.1	H. F. Hurst.
Wallasey‡	20,000	78	31	4	4	4	1	11	7	3	..	..	..	1	..	..	2	4	7	..	2	40.7	16.2	1.6	2.1	I. Byerley.
Warrington†	40,000	154	55	12	13	2	4	16	8	..	..	..	..	..	..	..	..	13	7	3	4	50.2	17.9	0.0	4.2	G. W. Joseph.
Wednesbury†	26,000	79	34	14	6	1	*	7	6	8	..	..	5	..	1	..	2	*	..	2	..	39.6	17.0	4.0	2.5	J. C. Garman.
West Bromwich	54,000	207	105	33	22	*	*	6	23	11	..	2	5	..	3	1	..	*	*	*	*	46.6	23.7	2.5	*	J. Manley.
West Derby	33,693	95	38	9	6	2	5	11	5	3	..	..	1	..	1	..	1	8	4	..	..	34.3	13.7	1.1	2.9	W. Carter, M.D.
Weston-super-Mare	14,000	33	23	4	1	1	1	6	10	3	..	..	..	..	2	1	..	1	4	..	..	28.7	20.0	2.6	0.9	C. V. Hitchins.
Weymouth	15,269	32	22	6	2	..	2	4	8	1	..	..	..	..	..	..	1	1	1	..	2	25.5	17.5	0.8	0.8	H. Tizard, M.D.
Widnes	22,000	93	37	13	5	4	3	11	1	..	..	..	..	..	..	..	..	7	3	4	..	51.4	20.5	0.0	3.9	W. Cooper.
Willenhall‡	19,300	51	22	9	1	3	..	6	3	8	..	..	2	1	2	..	3	4	2	..	..	34.4	14.9	5.4	2.7	W. H. Hartill.
Withington†	15,000	30	13	1	3	2	..	2	5	3	..	..	1	..	..	1	1	1	..	..	..	26.1	11.3	2.6	0.9	T. C. Railton, M.B.
Wolverhampton†	76,000	237	126	38	24	5	7	44	29	25	..	..	2	..	4	1	1	25	9	8	25	40.7	21.6	1.4	4.3	J. H. Love.
Workington	10,000	43	25	4	4	1	3	10	3	3	..	2	..	..	..	..	1	2	4	..	..	52.3	30.4	3.6	9.7	J. Ward, M.D.
Worthing	9,540	21	24	3	2	2	..	5	12	1	..	..	..	..	1	..	..	3	..	..	..	26.8	30.6	1.3	3.8	C. Kelly, M.D.
York	46,850	141	81	22	11	4	6	26	12	6	..	3	1	..	..	..	2	11	11	3	9	39.2	21.0	1.6	2.9	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

§ The death-rate, exclusive of the deaths of moribund visitors, was 21.46.

Table for March) watering-places, did not exceed 18.2; and the zymotic death-rate was but 1.3 per 1,000 of the estimated population. These rates differed but slightly from those which prevailed during March. Exclusive of Brighton, for which we are unfortunately unable to give the information, the death-rate from diseases of the respiratory organs in these watering-places, during April, was so low as 2.8 per 1,000, whereas it averaged 4.7 in the aggregate of 176 urban sanitary districts. These statistics afford eminently satisfactory evidence of the present sanitary condition of the sixteen watering-places and health-resorts which now contribute to our monthly list. We hope that, from time to time, other of the English and Welsh watering-places will recognise the advantages which our Table affords of supplying trustworthy information, which serves as the most complete defence against false reports of fatal epidemic prevalence of zymotic disease, liable to be spread from interested motives.

SPECIAL REPORTS.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

A MEETING of this Society was held on April 16th, Dr. Bristowe, President, in the chair. After the minutes were read, a report was brought up from the council 'on the advisability of memorializing the Government to take steps for making the appointments to the post of medical officer of health throughout the country permanent', recommending that no action be taken in this matter at present. (Carried). Also as to 'the best means by which the existence of cases of infectious disease in our metropolitan district can be communicated to the medical officer of health, and the other metropolitan districts'. The Council advised that a circular letter be sent to all metropolitan medical officers of health, requesting them to interchange complete lists of the streets in their districts in which infectious diseases had occurred. The exchange to take place with the officers of all the districts abutting on their own'. Carried unanimously. Dr. J. Shea, medical officer of health for Reading, and Mr. H. A. Lawton, medical officer of health for the sanitary district of Poole, were elected extra-metropolitan members. Dr. Tripe then proposed 'that associates, being contributors to the funds of the society, shall henceforth have equal privileges with members at the ordinary meetings of the society. Referred to the Council for consideration and report. Mr. Edwin Chadwick, then brought before the society the expediency of altering the manner of taking the census, as regards the preliminary enumeration, which he thought might be done by the superintending registrars, and thus allow the population returns to be published about two years before they would otherwise be issued. He gave statistics of the annual change in the population, showing the value of an early publication. Referred to the Council. Dr. Bristowe then mentioned that the President of this Society had not received notice to attend the International Congress of the Presidents of various societies, held at the College of Physicians, and that this oversight would be remedied whenever a future meeting shall be held. Dr. Vinen reported that no conclusion had been arrived at by the managers of the Metropolitan Asylum District Board, as to the reception of non-pauper cases into their hospitals, except that at their meeting held on March 6, 1880, they had sent to the Local Government Board a synopsis of the replies by the Vestries and Boards of the Metropolis, in answer to their letter, requesting to be informed how many beds would be required by each. Mr. Wynter Blyth then read his paper on 'The Prevention and Propagation of Diphtheria', which is printed in full at page 407.

Dr. Hill then read his paper on 'Diphtheria and Typhoid, and their Concomitant Conditions in Birmingham'. He said that he had personally examined all the houses in which a death from smallpox, typhoid, and diphtheria had occurred, especially as regards their water-supply and drainage. He believed that scarlet fever and diphtheria were associated in some cases, and that croup and scarlet fever, although arising from different causes, are often confounded with diphtheria. He had not found that the latter disease had any special habitat in Birmingham, and that although he had never seen it as an epidemic, yet sporadic cases were most frequent in the central parts of the town, and at Edgbaston, which contains the best houses. Most of the cases of diphtheria occurred above the mean level of the town, whilst typhoid is most frequently found at the lower levels. He did not find dampness of soil or any particular kind of house predispose to attacks of diphtheria. As regards the water-supply, he did not think more cases occurred amongst the population using shallow well-water than the deep, nor amongst those who used 'middens' than where the pail system was adopted; but in 49 out of 71 houses in which the disease occurred, there were palpable defects in the drains, which admitted sewer-air into the houses. Typhoid had decidedly decreased since 1874, and especially last year, when the death-rate was only 0.22 per 1,000 inhabitants against 0.56 in 1873. He found comparatively few sanitary defects in houses occupied by typhoid as compared with diphtheritic patients, and that the latter were found chiefly in good class houses. Dr. Tripe said that in certain respects his experience agreed with that of Mr. Blyth and of Dr. Hill, as he had only met with one epidemic of diphtheria, when the cases occurred in the highest part of his district, in good class dwellings having very badly constructed drains which ventilated into the houses. He believed the disease was frequently caused by the specific poison finding entrance by sewer air into the houses or cisterns, but was often spread by direct infection. He rarely found bad drainage in houses where there were typhoid cases, but very commonly where diphtheria occurred. Dr. Moore of Petersfield had only met with sporadic cases of diphtheria. These had been met with in all kinds of houses, and with considerable frequency, whilst typhoid was rare. There is no system of sewers in the town, as the sewage runs down the sides of the streets, and often emits very disagreeable smells in summer. He believed the disease was contagious. Dr. Dudfield is of opinion that there is great exaggeration in the number of deaths returned as from typhoid and diphtheria to the Registrar-General; that there is a kind of fashion in giving death certificates; and that there is a tendency now to return all cases of cynanche as diphtheria. Dr. Woodforde found this disease to be most frequent in damp, low-lying places, instead of on high ground, as was noticed by Mr. Blyth. Dr. Corfield scarcely thought it probable that the diphtheritic poison is carried by air in the manner described by Mr. Blyth. He believes it to be spread by contagion, and not to arise spontaneously, and that it ought never to be so reported until all sources of infection

had been carefully examined. In most cases to which his attention had been directed he found bad drainage admitting sewer-gas into the houses. Dr. Thomas drew attention to Mr. Power's report on the outbreak of this disease in the north of London, showing that infected milk was concerned in its spread. After some remarks by Dr. Browning and Mr. Murphy, the President proposed a vote of thanks to the authors of the papers. He then said that he agreed with Dr. Corfield as regards the action of contagion in spreading diphtheria; that his experience showed that the prevalence of typhoid and diphtheria was under-estimated, as many slight cases escaped notice, and gave an instance in his own family. As regards typhoid, he had met with many cases in one family, and usually found bad drainage or polluted water-supply. He had also seen numerous cases of diphtheria in the same house, and had known it spread in a hospital ward to nurses and others. Mr. Wynter Blyth and Dr. Hill then replied, and the meeting adjourned.

THE EDINBURGH SANITARY PROTECTION ASSOCIATION.

THE second annual meeting of this Association was held in the Masonic Hall, George Street, Edinburgh, on Wednesday, the 31st March 1880. In the unavoidable absence of Sir Robert Christison, it was proposed by Professor Douglas Maclagan, M.D., that Professor A. Crum Brown, Vice-President of the Association, should take the chair. The Secretary's report stated that at the last annual meeting on the 26th March 1879, the Association consisted of 497 members. As is usually the case with newly-formed organisations, a large number of members—from one cause or another—retired at the end of the first year. One hundred and sixty-nine gentlemen and ladies, or more than one-third of our number, withdrew their names. Their places have been filled up by new members, and, although numerically the Association is about thirteen short of what it was at the same time last year—that is to say, that there are at present 484 members as against 497 last year—yet, owing to the fact that 26 of these are county members, paying larger subscriptions than those resident in Edinburgh, the subscriptions amount to £28 7s. more than they did last year. The expenses have been considerably less. The accounts of the Association show a balance in favour of the Association of £73 8s. 11d. There has been an increase of 44 ordinary members and one life member, which brings the number up to the figure quoted above, and increases the balance to about £127 in favour of the Association. During the year over 400 inspections of houses were made by the resident engineer. Every member of the Association has had the opportunity of having his house inspected at least once, and, where necessary, or where repairs and alterations were being executed, the engineer's visits have been much more frequent. On the occasion of an outbreak of typhoid fever in the Sunderland and Bishopwearmouth Infirmary in September last, the services of the Association were sought and given, and, in a letter from the secretary, he says—'Allow me to add that the excellent report you sent us has been laid before both the sub- and general committees, and they requested me to say that, should any questions arise requiring further information, they will do themselves the honour of applying to you.' The services of the Association also have been placed at the disposal of the managers of the industrial school, Kilmarnock; the school board at Kelso; and the owners of country houses in Argyllshire, Banff, Forfar, Fife, Kinross, Haddington, Renfrew, Selkirk, and other counties in the Southern District in Edinburgh, the Royal Hospital for Sick Children; Chalmers' Hospital; the Maternity Hospital; several of the Merchant Company's and other schools; two of the largest bank buildings, and other public offices, have been placed under the supervision of the Association as regards sanitary matters. A branch association, consisting of nearly fifty members, has, through the instrumentality and exertions of Professor Fleeming Jenkin and Dr. Mactier of Kinnessburn, been formed at St. Andrews. Lord Shand, Mr. John M'Laren, and Mr. David Smith, have intimated their wish to retire from the council, owing to their numerous engagements.

BIRMINGHAM AND MIDLAND ASSOCIATION OF MEDICAL OFFICERS OF HEALTH.

AT the meeting of this association on April 15 there were present Drs. M. A. Fenton, A. Hill, Bostock Hill, D. Strange, Bond, Perks, Page, Manley, H. May (hon. secretary), etc. The association resumed the discussion of the following resolution, which was moved at the last meeting by Dr. W. M. Thursfield (see SANITARY RECORD, p. 311):—'That this association is of opinion it is desirable that a general Act of Parliament should now be sought as speedily as possible which would enable any sanitary authority to require the notification of cases of infectious disease occurring in its district, without the necessity of its obtaining a local Act containing special clauses as to such notification, as has already been obtained by a number of towns throughout the country. That, in the opinion of this association, it is desirable that each member of this association should bring this resolution under the notice of the authority under which he acts, and urge upon it the advisability of its memorialising the Local Government Board in favour of such an Act; also that the co-operation of other similar associations be sought in bringing this subject under the notice of the Government.' Dr. Strange said he thought there would be a difficulty in carrying out the proposal. If the duty of giving information of infectious cases was laid upon the medical men, he thought they would object to being made informers; and if the duty was laid upon householders, how were they to secure that the householders should perform it? He thought that information need only be given in such cases as the medical attendant thought ought to come under the attention of the medical officer of health, as, for instance, where the disease was very malignant, or where there were no proper facilities for isolation at the patient's home. Dr. Bond said he concurred in the object which was sought by the mover of the resolution, but he thought the proposal would only be dealing in a piecemeal manner with a subject which ought to be treated comprehensively. They ought first to insist on the need for sanitary authorities to make provision for suppressing infectious diseases, and the notification to them of the existence of such diseases would come in as a secondary matter. He moved, as an amendment, 'That in the opinion of this association the time has now come when it is desirable, in the interests of the public health, that a general and comprehensive inquiry should be made into the subject of infectious disease, including the means at present

existing for arresting its progress, the improvement in such means, which experience has demonstrated to be expedient and practical, and the legislative measures required to carry such improvements into effect. That a memorial embodying this resolution be presented to the President of the Local Government Board by a deputation from this association; and that other sanitary associations and medical officers of health generally be invited to co-operate with this association in promoting this object.' He pointed out that the change of Government would afford a favourable opportunity to press the importance of a full inquiry into the subject. Dr. C. Perks seconded the resolution, and, in answer to the remarks of Dr. Strange, said that at Burton and Leicester, where there were local acts enabling the authorities to require notification of the existence of infectious cases from the medical profession for a small fee, there was no difficulty in carrying them into effect. Dr. Manley supported the amendment. Dr. May spoke in favour of the original resolution, pointing out that even where the sanitary authority had not furnished all the means for repressing infectious disease which were desirable, the simple information as to the existence of infectious cases was often very useful. After some further discussion the following resolution, proposed by Dr. Bond, was carried:—'That whilst this association concurs in the desire which has been expressed for making the notification of infectious disease compulsory and uniform in the mode of its enforcement, it is of opinion that the time has now arrived when it is desirable, in the interests of the public health, that a general and comprehensive inquiry into the subject of infectious disease, including the means at present existing for arresting its progress, the improvements in such means which experience has demonstrated to be expedient and practicable, and the legislative measures required to carry such improvements into effect.' A further resolution was carried, authorising the president, secretary, and Dr. Bond to communicate with other bodies, and, if desirable, to promote a deputation to the President of the Local Government Board. It was decided to hold the next meeting of the association at Worcester, and to postpone till then the hearing of a paper by Dr. Strange and the discussion of the paper read by the president at the last meeting on the subject of infant mortality.

TYPHOID FEVER AT BRISTOL.

BRISTOL seems to be particularly unfortunate in its milk-supply. For the third time within the last two years an outbreak of typhoid fever has again been reported as the result of contaminated milk. At the last meeting of the Bristol Sanitary Authority, Mr. Davies reported that eight cases of typhoid had appeared in one locality in the district, the sufferers residing in five different houses. The only connection between these cases seemed to be their milk supply, which they receive from one and the same milkman. The milkman receives his supply from three parties in the country, one on the north side of the city, and the other two on the south side. No fever had appeared among families supplied with milk from the north side, and there was no cause to suspect any contamination of that supply, which was therefore eliminated from that inquiry. One of the sources on the south side was also completely exonerated from suspicion, and Mr. Davies, therefore, went several miles into the country to the farm of the principal milk producer. He found the dairy and all in it, and all the surroundings of the barton, clean; but the only available water-supply, which was used for all purposes, was from a mill-stream. He followed this stream up the valley for nearly two miles, and discovered some closets discharged into it, and that a cesspool overflowed into it at winter time. In one place he found part of the entrails of a bullock in it, and a little higher up the two hind quarters of a calf, dead of the quarter evil—a very contagious disease, chiefly affecting yearling calves —supposed to be identical with splenic fever in older cattle and of malignant carbuncle in man. These quarters were macerating in the stream, producing a cold solution of gelatine mixed with the germs of the black quarter disease, which, if identical with splenic fever (Milzbrand), are a peculiar form of bacteria, the introduction of which into the circulation of any warm-blooded animal is inevitably fatal to the animal experimented on. Singular to relate, the farmer and his family have been in the habit of drinking water from this stream, and have no other available supply, without any evil results. Mr. Davies thinks that there will probably be a few more cases of fever, which are now in a state of incubation; but he is of opinion that the cause of the outbreak has now been discovered and cut off from the city.

This outbreak, and the circumstances revealed by Mr. Davies's inspection of the stream, afford another example of the complete futility of the present law with regard to dairies. Under the Order of Council relating to this subject, due provision ought to have been made for the purity of the water-supply to the farm in question; yet this obvious source of pollution is allowed to exist until Mr. Davies's vigilance ferrets it out. In former issues we have gone at length into the absurdity of placing the sanitary regulation of dairies under the control of the Local Veterinary Authority; and we trust that the attention of the new Parliament will without delay be drawn to so glaring an anomaly. There need, we think, be no fear of the regulation of dairies by Sanitary Authorities being resented by the trade. Mr. Davies has favoured us with a letter from one of the most extensive milk dealers and producers in his neighbourhood, in which the importance of such a regulation is fully admitted; indeed the writer, in view of the dead letter to which the Order of Council has degenerated in the district, states the intention of himself and certain colleagues to have their premises inspected independently by a medical man. It is not, however, for this class of milk-dealers that compulsory powers are required, but rather for those unscrupulous and careless dealers who think of their pockets before the danger to their customers. Whilst the doings of these remain unchecked and unregulated, we must look for periodical reports of milk-epidemics; and the sooner the law is altered, the fewer epidemics will there be to record.

The population of the globe may be roughly assumed at 1,421,000,000, divided thus:—Europe, 309,000,000; Asia, 824,000,000; Africa, 199,000,000; Oceania, 4,000,000; America, 85,000,000. It has been calculated from the mortality tables of known countries that the annual number of deaths throughout the world is 35,693,350, or that, in other words, 97,790 persons die each day. On the other hand, the balance of population is more than kept up by births at the rate of 104,800 per day. Seventy new lives are ushered in every minute of the 24 hours.

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

LOWER THAMES VALLEY MAIN SEWERAGE.

The following extracts from a letter addressed by Mr. Bailey Denton to the joint Board, which Sir Thomas Nelson stated, in his evidence at Kingston, he had consigned to his waste paper basket, will be read with interest by some of our readers. The letter from which the extracts are taken was printed by Mr. Denton and sent by him to Mr. Bell, the Clerk of the Board, at his request, for circulation among the members.

'This decision (*to adopt intermittent downward filtration combined with surface irrigation*), when considered in connection with the intention to apply the sewage to land at the confluence of the two rivers, Mole and Ember, not far from their junction with the Thames, appears to me to be attended with so many drawbacks of an important and forbidding character that I hope that I may be permitted to state in a manner, not otherwise than loyal as an invited competitor, what these drawbacks are, and to point out why the treatment you have determined to adopt will not have a fair chance of success. It is, in fact, because I believe that the selected scheme, if carried out, will bring discredit upon the treatment I am so anxious to uphold, and because I really believe it would be better to abandon the land selected, even if its compulsory purchase should be sanctioned by a Parliamentary Committee, that I am induced, in good faith, to place my views before you, hoping that you will not attribute to me any unworthy motives when doing so. When expressing this hope I declare it to be my intention in no way to support by evidence or otherwise local opposition, but to do my best to show by fair exposition in what respects the land at Moulsey must fail in that complete success which it should command.

'If I rightly understand the scheme of Messrs. Haywood and Birch, it aims at the collection of the sewage from the different subordinate districts, not by a course of sewers falling with the natural fall of the valley and increasing in size with the accretion of waters passing down the valley, but by sewers having inclinations against the fall of the valley, and increasing in size as the sewage is raised. Thus the total aggregation of sewage will be gained not near the tidal reach of the river (where storm-water overflows might be used on extreme occasions—as in the metropolis—with impunity) but above Teddington Lock, where any discharge of sewage under any circumstances will be rigidly resisted. It is no part of my object in addressing you to point out the great difficulties in construction which will attend this reversal of the ordinary rules recognized in drainage works, for, although the physical conditions of the valley and the circumstances which have governed the sewerage of the subordinate districts especially forbid a departure from them, such difficulties may be overcome by great expenditure. I shall, however, be pardoned for pointing out the facts, that diluted sewage, which is practically admissible into a river within its tidal reach on occasions of excess, is entirely inadmissible above, and that the difficulty of dealing with sewage in any way when its quantity is suddenly raised by the influx of foreign waters is almost insurmountable if the law is to be obeyed.

'Whatever may be the intention of your Board with regard to the exclusion of foreign waters, it is quite certain that the influx of subsoil water and surface water, which cannot now be excluded from the sewers under the special conditions of the case, will be very much greater than in the generality of cases.

'*Subsoil Water.*—As much the greater part of the inhabited portions of the subordinate districts constituting the Joint District is already sewered, and the sewers are far from watertight, the "sewage proper" from these districts will be largely diluted with underground (subsoil) water even in dry summer weather, whilst from the porous nature of the soil of the valley, the rain falling on the surface during the winter, when evaporation is least, will be quickly absorbed, to reach its maximum height in the ground whenever the Thames may be in a state of flood. The pressure of subsoil water upon the leaky sewers will then be very great.

'*Surface Water.*—Though the separation of surface water from the "sewage proper" may be pressed by the Joint Board upon all the subordinate authorities, and though it may be carried out by them to a certain extent, there will always remain tributary to the private sewers of all dwellings that portion of the rainfall which falls upon back roofs and outbuildings and upon paved yards and other impervious surfaces, which must be admitted into the sewers owing to the extreme difficulty of connecting such surfaces with any system of separate drainage. Taking into consideration the wide extent of the joint area and the character of the buildings thus contributing an off-flow to the sewers, it will be found that 4,000,000 to 5,000,000 gallons will be readily collected from this source on extreme occasions of rainfall. An aggregate superficial breadth of 400 acres, only throwing off ½ inch of rain, will contribute four-and-a-half million gallons.

'There cannot be a doubt but that much of the land selected near the confluence of the Mole and Ember is, like that in many other parts of the Thames Valley, extremely porous, and, as such, is suitable for filtration; and it is equally certain that by artificial under-drainage the percolative powers of that soil, and, indeed, of all soils, may be quickened when there exists a clear outfall unimpeded by floods. But it is also certain that this extreme porosity has its drawbacks as well as its advantages, inasmuch as outside flood and highland waters will as rapidly enter and pervade the soil by lateral pressure and diffusion, as rain falling upon its surface will descend vertically by gravitation; and directly this is the case æration ceases, and the value of the land as a filter vanishes, for its oxidising powers are gone. The flood water, in fact, raises the underground water to its own level, while that water travelling through the soil from a higher to a lower level raises it still higher, so that if a Thames flood at Moulsey be taken at 30 feet above Ordnance datum, an addition above that height according to the rainfall of the locality must be made to meet the water pressing through the soil from the higher ground, in order to arrive at the quantity of ærated soil which will be left for sewage cleansing. I may further point out to you that the deeper the ærated soil the more perfect the cleansing of the sewage passing through it, and that any land which does not command an effective under drainage of 6 ft. suffers from a deficiency in depth, for which compensation must be given by increased superficial area.

'I do not wish to convey, that, if there existed no other site on either the Surrey or the Middlesex side

of the Thames free from flood influences, the selected land might not, with great outlay in levelling and forming the surface, be made to fulfil, in some way, the duties which you expect of it ; but what I do desire most emphatically to state, is that, inasmuch as the sewage will reach its maximum quantity when the area of surface to receive it, and the cubical bulk of ærated soil to cleanse it, will both be reduced to a minimum, the work can never be perfectly satisfactory, and that therefore it is far better to abandon that land, although it is "within" the district, and seek other land "without" the district, which in nine instances out of ten is done, than adhere to a scheme attended with disadvantages which no artificial drainage will entirely remove.

'Speaking as a sewage farmer as well as an engineer, who has had much to do with the preparation of land for the cleansing of sewage, I can assure you that the practical difficulties, which are always great, attending the distribution of large bodies of sewage, become very much greater directly the delivery of the sewage is irregular in quantity, and uncertain in the times of delivery, without any power of relief.

'This remark, of course, applies to all sewage farms, but it is particularly applicable where the cleansing medium may be as suddenly reduced by flood to a minimum, as the diluted sewage may be raised from the same cause, only less directly applied, to a maximum. To provide against such difficulties will involve an outlay in the levelling and preparation of the surface, far exceeding any estimate already given ; and this increased expenditure will convert a treatment which itself is the cheapest of all modes of sewage disposal, into a most costly one, without that certainty of success which may be so easily insured on the Middlesex side of the Thames, where the conditions ruling the tributary streams are as favourable as those of the Mole and Ember are the reverse.—I beg to subscribe myself, your faithful servant, J. BAILEY DENTON.

'P.S.—The convictions I have here expressed led me to suggest to Sir T. Nelson at the outset that notices should be given, and plans deposited, for the acquisition of the Harmondsworth land on the Middlesex side (which is free from both flood and residential objections, and where the sewage would be favourably applied to land in a market garden district), as well as the Moulsey land on the Surrey side, *so that the ultimate selection might be made after more mature consideration than could possibly be given at the time it was decided to proceed.*'

HOSPITAL ACCOMMODATION FOR INFECTIOUS DISEASE.

During a recent outbreak of small-pox in a town having a population of, say, 54,000, many incidents occurred in connection with sanitary arrangements for meeting the emergency which would each separately form a theme for most important discussion. I shall, however, confine myself to a detail of circumstances connected with one portion only of these incidents, being that portion connected with and bearing upon the very important subject of the relative duties of Sanitary Authorities and Poor-Law Guardians, as regards responsibility of providing hospital accommodation for those cases of infectious disease which, under the Public Health Act, can, and should be, compulsorily removed for purposes of isolation.

In November 1876 the Urban Sanitary Authority of the town to which I refer, in consequence of an epidemic of scarlet fever, purchased a building with considerable portion of ground attached, to be used as a hospital for the reception of cases of infectious diseases such as scarlet fever, typhoid fever, etc. This building was practically unsuitable for small-pox cases. The hospital was established under the Public Health Act, 1875. The printed instructions issued by the Sanitary Authority were to the effect that all patients admitted to this hospital should be 'non-paupers', and give a guarantee for the payment of a certain sum weekly towards his or her maintenance in hospital. After the outbreak of small-pox in this town, the above rule was enforced with some exceptions, and the Guardians took into their hospital all patients who were not non-paupers. The Sanitary Authority erected additional accommodation for that class which they believed they were responsible for, and such accommodation as was doubtless sufficient for the demand. After a time, when the outbreak assumed larger dimensions, the Guardians began to complain that the Sanitary Authority was creating paupers, by declining to take any except those of the class named non-paupers, for which class the hospital was originally intended. The Poor-Law Authorities also contended that the term 'pauper' can only be applied to cases who have been, and are at the time of the occurrence of the attack, in actual receipt of Poor-Law Relief. The Sanitary Authority, on the other hand, argued that their hospital was intended for those only who could contribute towards their maintenance while there, and that all cases who could not do so were practically paupers. It was, and is yet, the great question, 'What is a pauper; must he or she be in actual receipt of Poor-Law Relief, medical or otherwise? or is it sufficient under the above conditions that they cannot afford to avail themselves of the statutory hospital?' And here, again, the third question arises upon which Authority, 'the Sanitary Authority', or the 'Poor-Law Authority', rests the responsibility of providing hospital accommodation for this class of cases, which appears to consist of those too poor to avail themselves of the 'Statutory Hospital', and at the same time not poor enough to be taken charge of by the Poor-Law Authorities. I must here observe that in this instance the Poor-Law Authorities were not provided with special accommodation for such cases as is the case with the Dublin, Liverpool, and other Unions, so the matter resolved itself into the question, 'which Authority was the one to provide the necessary accommodation?' The result of the contention was the visit of a Medical Inspector from the Local Government Board, who distinctly enough propounded the opinion of the Board on the *questio vexata*, the opinion, I believe, of the legal adviser of the Board, which is, "that Poor-Law Authorities have only to deal with destitution, and not with disease, except in the case of absolute paupers, and that the Sanitary Authority is the only properly constituted Authority for the purpose of dealing with infectious disease, and should provide the accommodation necessary — that no cases of infectious disease should be admitted into a Workhouse Hospital, except those which occur within the House; finally, that a pecuniary arrangement should be made between the two Authorities for the reimbursement of expenses incurred by the Sanitary Authority for keep and maintenance of pauper patients. Of course, this decision of the Local Government Board necessitated the immediate erection of largely increased hospital accommodation by the

'Sanitary Authority', to meet the demand suddenly made upon them, and might have created a deadlock, and did create a considerable difficulty for the Medical Officer in the way of removal of patients, owing to the yet unsettled question, 'What is a pauper?' in connection with the above-mentioned circumstances. The good temper and anxiety to work for the public sanitary good, evinced on both sides, fortunately prevented any practical obstruction. Of a total of 272 cases, 228 were removed to hospital, and an outbreak, grossly exaggerated and described as 'a wide-spread epidemic', was, with the exception of a few scattered cases, restricted within narrow limits, and is now, I may say, happily extinguished.

I am not aware whether the questions at issue have been raised or discussed on any former occasion, but I am sure that the opinion now pronounced by the Local Government Board is not generally understood or widely known, and I think it should be made known as widely as possible. The effect is that in all towns the Sanitary Authorities should at once proceed to erect suitable accommodation for all classes of infectious diseases, as apparently they are the parties responsible, and not await an outbreak of epidemic, and find themselves blamed and pretty well abused, for absence of hospital accommodation which they may have been utterly and innocently ignorant they were called upon to provide.

MEDICAL OFFICER OF HEALTH.

[We do not think that any such ignorance exists, as to the relative responsibilities of the poor-law and sanitary authorities, as our correspondent supposes. The policy of the Local Government Board has, for several years past, been to discourage the building of wards for infectious diseases at all at Workhouses, and to advocate the provision by the Sanitary Authority of a hospital for all classes, to which the pauper cases could be sent by arrangement. Despite 'Medical Officer of Health's' argument, we cannot but think that there was the greatest mismanagement in dealing with the small-pox outbreak to which he refers; and 272 cases of a disease so eminently preventable as small-pox, are only properly described as a wide-spread epidemic. The chief use of a hospital for infectious cases is for the reception and isolation of persons who, though not paupers, cannot be treated at their own homes without danger to others; and to impose on such persons a charge of fifteen shillings a week, which is the 'certain sum' referred to in this letter, as a condition of admission to the hospital, is, practically, to shut them off from its advantages altogether. As we have said repeatedly, it is unfair to the independent poor to brand them as paupers by making them go, when isolation is needed, into the workhouse hospital. In this particular epidemic, by far the largest number of cases had to go to the hospital at the workhouse because of the prohibitive price put upon admission to the 'Statutory' hospital, by the sanitary authority. The epidemic has probably had the effect of teaching the latter differently, and of warning them that to be effective and useful, their hospital must be made cheap and attractive. In fact, in the particular town from which our correspondent writes, we think that admission to hospital should be absolutely free to whomever consents to be isolated there.—ED.]

DRAIN VENTILATION.

The enclosed letter was written to a local journal, at a sea-side watering place, where a most perfect system of drainage has been carried out: as it particularly points out the necessity, under the most favourable circumstances, of the ventilation of house drains, I enclose it, as it may interest your readers.

J. R. T.

Sir,—I once ventured an opinion in your columns that I would rather live in a well-drained and well-ventilated house under our old system of drainage, than in a badly-drained and badly-ventilated house under our present system; the idea seems to have become common that our present system, which has cost us so much, is so perfect that all precautions can be dispensed with as regards private houses. I write these lines to try and do away with this idea, which is not only erroneous, but is likely to lead to serious results.

However good a system may be, noxious gases must, sooner or later, be generated in a sewer. Our present system has rescued A— and B— bays from impurity, but it cannot prevent sewer gas from forming in a sewer. I write under correction when I say that I believe it was once intended to consume the gas by burning it up in furnaces on two or three (or more) elevated spots in C—; if this plan was ever proposed, I regret that it was ever discarded; and that the present one of air shafts was substituted in its place.

It may be generally allowed that if two vertical tubes are joined by a horizontal one at the bottom, and if one of the vertical tubes is warm and the other cold, there will be an up-draught up the warm tube and a down-draught down the cold one. Carrying out this idea, supposing that the warm tube is inside a house and the colder one outside, it follows that there would be a constant suction through the tubes into the house.

It would be interesting to ascertain the temperature at different places inside the main sewer of the present system; if, say, under the M— Hill, or at the Post Office, the temperature is higher than it is by the Sea Road, there will be a constant suction of gas towards the place of highest temperature; it will be said that even if this view is correct, there are air shafts for the gases to go up. But do they go up? If drains communicating direct with well-warmed and well-heated houses run into the sewer, would they not tend to suck the gases up instead of allowing them to escape up the air shafts? and if any sudden storm of rain or a gale of wind were to press on the gases in the sewer, this would tend to increase the suction which I have tried to describe.

What is the most simple way of preventing the sewer gas, when thus sucked or driven up, from entering the house? It is as follows: let a mason's trap be placed near the house, in the drain; and from the outer or town half of this trap, run a 2½ in. or 3 in. rain-water pipe to about three or four feet above the roof of the house. Some 'suggestions' issued by the Local Board state that no house should be without this trap and ventilating pipe. Why are not these suggestions carried out? I was once told that the Local Board have no power to insist upon their being attended to; in other words, if a hotel or lodging-house keeper chooses to do so, he can snap his fingers at the 'suggestions', and can keep his drains in such a state as to threaten serious injury to the health of any visitors who may happen to fall blindfold into the trap. I would recommend any one, after reading these 'suggestions', to walk along some of the higher roads in C—, which overlook the houses below; and I would ask him, how many ven-

tilating pipes he can see? He would have little difficulty in counting them on his fingers!

One of the suggestions recommends that rain-water pipes should in no case communicate direct with the drains; why, then, is not this done? Why do we see rain pipes ending above in the usual bell, close under the eaves of the roof, and disappearing below into the foot pavement, doubtless into a drain, instead of being carried under the flags to the channelling? I do not think that visitors coming to C— are sufficiently protected in these matters. I believe that all cases of contagious and infectious diseases have to be reported to the Local Board; if not, they should be; and an advertisement should be inserted weekly in your columns, that every known information on such matters would be willingly given to visitors, on applying at the Local Board Office.

I am told that the Local Board has no power to insist on its recommendations being observed; but they could easily adopt such steps as would make it to the personal advantage of hotel and lodging-house keepers to observe them. The following plan has been adopted elsewhere with success: let an association be formed, under the title of the 'C— Sanitary Association'; let the yearly payment to it be £1, for which sum members would be entitled to have their drains, etc., inspected by a Local Board officer, specially appointed for this duty, and duly certified by him. Let the names of members, and the rules of the Association, be printed and published yearly, and sold by all booksellers; any alteration recommended by the Local Board officer would be again passed by him before it would be supposed to be fit for use; I mention this, as house occupiers cannot be too particular or too careful as to the way in which sanitary alterations or requirements are carried out by workmen. The way in which this scheme would work is plain; any visitor, when taking lodgings or rooms, would first provide himself with a list of the 'C— Sanitary Association'; he would probably confine his visits to the addresses of those whose names are on the list; and on going to any of these houses, he would at once request permission to see the last certificate of the Local Board officer. The great advantage of this scheme is that no preparatory steps are necessary; it might be commenced to-morrow. The funds of the Association would accumulate, and would allow of the premises of persons really too poor to subscribe being inspected and put in order.

Finally, I say to all who wish to have healthy houses, 'If possible, remove the old lead soil pipes from the interior of your houses, and replace them by soil pipes of glazed earthenware outside the house, prolonging these pipes upwards to about three or four feet above the roof; at the bottom of the soil pipe, or at some spot before the drains leave the premises, let there be a mason's trap, the outer or town half of this mason's trap being ventilated by a 2½ in. or 3 in. iron pipe—the usual rain-water pipe is very good for the purpose—running up also to about three or four feet above the nearest roof; and see that the work is properly done. You will then enjoy a safety from sewer gas and fever which no system of general drainage, however perfect, can insure.'—Yours truly, A RESIDENT.

THE POLLUTION OF WATER-COURSES.

Do I rightly understand the Sanitary Engineer of the Lee Conservancy Board to say that a community of 2,500 persons can and does exist within the basin of the Lee, and discharge its sewage, whatever may be its total amount, into one of the tributaries of that river without the Conservators making positive efforts by legal process to prevent the pollution, which must be the inevitable result? As one of the consumers of the water of the Lee I want no chemical analysis to confirm the conviction to be drawn from reading the letter, signed 'Lamorock Flower', that the existence of a Conservancy is no security at all. If the inhabitants of Stevenage were stricken with cholera, of what avail would the fact be that 'Stevenage is a very remote case', and of what value the Sanitary Engineer's declaration that his ambition is to make the Lee a model watershed, when he shews that he has allowed six years to go by without taking any steps to prevent the certain pollution which, it is clear, is now taking place?

A CUSTOMER OF THE EAST LONDON WATERWORKS COMPANY.

VENTILATION OF SEWERS AND DRAINS.

I was rather amused at reading the two communications from 'J. R. T.', at pp. 361 and 397, upon this subject. He cautions the public against Dr. Jones' plan, and tells us that he does not approve of syphon traps for drains, but prefers the old-fashioned 'mason's trap' or cesspool. I fear, judging from this, as well as from the remarks he makes about the 'pressure' of the sewer-gas, that he has extremely little practical knowledge of the subject. The 'trap' or cesspool he shows on p. 361 is a very dangerous appliance, as when made by masons it often leaks over the top, or around the sides of the tongue, and so is a sham; besides, it holds far too much water. We do not want accumulations of filthy water lying close to the house. Further, the drawing on p. 361 shows the drain going into the house; this is hardly a plan to be recommended, and what makes it worse is that, while doing so, he makes no provision for its ventilation. Nothing further need be said to show that the notions of this apprentice-sanitarian are, to say the least, open to improvement.

A MASTER TRADESMAN.

HOT-AIR CHAMBER FOR DISINFECTING CLOTHES.

Will some of your readers kindly give their experience with regard to the best form of hot-air chamber for disinfecting clothes? I find no difficulty in dealing with the bed-linen from infectious cases; they are watered by means of a water-pot with carbolic acid—1 in 40—and then taken to the laundry to be boiled. But with blankets, mattrasses, and wearing apparel, the case is different. In our stove—which is heated by a flue, which partly surrounds it, conveying heated air and smoke from a special fire—there is great difficulty in regulating the heat, and clothes are either burnt or imperfectly disinfected. What forms of stoves are there available which are heated, say, by superheated steam, and cannot therefore burn their contents, and which are at the same time perfectly ventilated? I am not certain if hot chambers might not with advantage be replaced by chambers provided with suitable apparatus for generating a sufficient quantity of SO_2 or Cl.

HENRY ASHBY, M.D.

Manchester, May 1880.

THE MINISTRY OF HEALTH.

I imagine that journals must have their seven ages as well as the human race. No one who has read certain articles which have recently appeared in one of your medical contemporaries can fail to see that it has at least reached its sixth stage, when its 'big, manly voice, turning again toward childish treble, pipes and whistles in its sound'. It happens that, for purely personal reasons, the late President of the Local Government Board had not a seat in the Cabinet. Though popularly known as a 'safe' man, his qualifications were apparently not such as to fit him in the eyes of his chief for the important post of a Cabinet Minister. Thus it fell out that, whilst several of the other members of the Government who in 1874 held subordinate places were in course of time elevated to more responsible rank, Mr. Sclater-Booth remained during the whole of his official career where he was first planted, without promotion and without a seat in the Cabinet. Your senile contemporary aforesaid, when the result of the late elections is declared, seized the occasion to write two rabid and long-winded leading articles in consecutive weeks, advocating in 'nervous' language the claims of the President of the Local Government Board to be a Cabinet Minister; and when (also for purely personal reasons) Mr. Dodson is elevated to that post, with a seat in the magic inner circle, the paper goes positively frantic with ecstasy. In a note published the same week that the intelligence becomes known, it speaks of the appointment as though it were the direct outcome of the journal's remarks; and it hugs itself mightily about the great promise of a Ministry of Health now that Mr. Gladstone has adopted its suggestion. Not content with this, it recurs to the subject in two distinct articles in its issue of this week, and as a magnificent and lasting memorial of the glorious occasion, 'creates' a Local Government Department, which is to achieve I know not what wonders in enlightening everybody (the Cabinet included) on the great principles of Public Health.

Of the tone of the articles in question, I could give your readers no adequate idea without trespassing too much on your overcrowded columns; but let me ask what, in the name of all common sense, can be the use of encouraging sanitary workers thus to believe in the advent of a Ministry of Health under the ægis of your contemporary, and of exciting hopes which it must know perfectly well will not be realised? Without venturing upon political matters, it will probably be quite safe to say that in admitting Mr. Dodson into the Cabinet, Mr. Gladstone has had regard to the man and not to the office. Prime Ministers have different notions as to the exact locale and number of Cabinet appointments, as every one with the least observation can see for himself. As a matter of fact, Mr. Gladstone has only reverted to an arrangement which existed when he was formerly in office, in giving the President of the Local Government Board a seat in the Cabinet. Your contemporary manages ingeniously to forget that Mr. Stansfeld was a Cabinet Minister as well as President of the Local Government Board. How far, I would ask, was the Ministry of Health accomplished while he was in office, with his snubbing of the Medical Department, and his delegation of the sanitary organisation of the country to sucking barristers and newly-fledged army captains? To talk of any improvement in this organisation accruing from the fact that Mr. Dodson is in the Cabinet, is to talk arrant nonsense. Nothing of good can be expected until—as you pointed out in various leading articles long before your contemporary woke up to any thought on the subject—the whole of the medico-sanitary functions that are now scattered about amongst different departments of State are welded into one homogeneous whole under the sole control of a Minister who shall in fact, as well as in name, be Minister of Health.

May 7, 1880. FRITHIOF.

SANITARY INVENTIONS.

EXHIBITION OF BUILDING APPLIANCES.

AT the Agricultural Hall, Islington, there has just been held the first of a proposed series of exhibitions of economical industry, and in this instance all kinds of building appliances were shown, divided into several classes. The display did not perhaps excite all the attention which it merited, but nevertheless many visitors attended, and were without doubt agreeably entertained and considerably instructed.

There was little under Class I to require notice from a sanitary point of view, but we must not forget in the matter of lighting the Hesperus lamp of Messrs. Jones and Willis of London. Being triplex, they give a light estimated as equal to forty-five candles, and this by reason of the perfect combustion achieved by the larger current of air which travels around the flame. Neither must we omit the powerful system of propelling pure air into a dwelling, as exemplified by the system introduced now into common use by Messrs. Verity Brothers of London, where a hydraulic fly-wheel is made to work fans in connection with a tube leading into a room. By this means warmed, iced, medicated, or perfumed air can be sent at will into an apartment by automatic action.

Under this class might also be noticed the metallic ribbon blinds of Messrs. Reynolds of London, which would if used greatly assist in the riddance of dust, and also the reversible treads and landings for staircases, exhibited by Messrs. Lindsay and Co., London.

Class II was confined chiefly to bricks, stone, and concrete, and of course the Patent Victoria Stone Company was duly to the fore with its drain pipes and sinks of various kinds, admirably suited for sanitary purposes. For pavement of areas and cellars slabs made of this material are practically everlasting, and they can be turned if they ever show signs of wear. A collection of silicated stone ware was also shown, suited for general sanitary uses, such as sewer and water pipes, and a special adaptability for this material seems to lie in its great suitableness for sinks. This last mentioned material is the silicated stone of Messrs. Hodges and Butler of East Greenwich. Among this class there shone out very prominently the patent concrete of Mr. Lascelles of London, and the prize bath attracted great attention. The sanitary ware of Messrs. Cliff and Sons of King's Cross, London, so suited for drain pipes, sinks, traps, and the like, were also well represented. As a novelty to some useful purpose there was also exhibited by the inventor, Mr. R. Beckett of Hartford, his new glazed earthenware wall boxes, for the reception of the ends of joists, so very liable to become rotten by their being bedded in wet walls, and walls subject to the attacks of damp.

As regards examples of stone for building, we have rarely noticed any exhibition so complete of these

most important items of constructive necessity. These were exhibited by Mr. Trickett of Milwall, and deserve to be duplicated at South Kensington and elsewhere. A new stone from the Keuper beds, admirably adapted for building purposes, was also exhibited by the Hollington Stone Company of Uttoxeter.

The machinery department was represented under Class III, and one thing greatly to be admired, and likely, if adopted in mansions, to save much air-fouling in passages and stairs, and a corresponding sense of cleanliness, was the automatic self-sustaining dinner lift of Messrs. Thomas of Cardiff.

A novelty was also exhibited in the shape of the 'simplissimus' chimney-sweeping machine of Mr. Ross of London, by the use of which any house chimney can be swept without a display of soot or inconvenience. It consists of merely a sheave and wire, and can be fixed by the merest tyro in a short time, while as regards use, once fixed it is difficult to see how it can ever get out of order.

It is now becoming so common to use engine power in houses for raising water, cleaning shoes and knives, and the like, that we cannot forbear noticing the 'Otto' silent gas engine of Messrs. Crossley Bros., Manchester. The cost of working it is about one penny per horse-power per hour, taken from the engine, with gas at London prices. It is also of great use in the mechanical ventilation of schools and churches, etc.

Under Class IV came a more miscellaneous series of exhibits, among which we noted the impervious damp-resisting solution of Messrs. Callender and Sons of London. They have also invented a pure bitumen damp-proof course, which, as it can be made in any length and width, must prove of immense value. The Indestructible Paint Company of London also exhibited their valuable paint, which when put upon a wall will enable the latter to be washed down, even with a solution of carbolic acid; and they showed their colourless preservative solution for rendering bricks and stone impervious. Messrs. Gay of London also displayed their impenetrable paint, now known almost everywhere. The silicated paint preparations of the Silicate Paint Company, Woolwich, also took high ground, especially with their Charlton permanent white, declared not only to be permanent, but absolutely non-poisonous. In this class of exhibits ought also to be mentioned the Parian solution of Messrs. Ransome of London for curing damp in walls and preserving stone from decay.

Class V was apportioned to builders' ironmongery, and there was of course a goodly show in this branch of appliances. An ingenious water-level indicator, for showing the quantity of water in tanks, even at a distance, was exhibited by Messrs. Blenheim of Egham. An excellent kind of water-bar for keeping out the drifting rain from the interior of basement windows was also shown by Messrs. Smith and Turner of London. The felts of Messrs. Engert and Rolfe of Poplar, and their fibrous asphalte anti-damp course, were also worth attention.

The exhibits under the head of sanitary appliances occupied naturally a considerable space in the exhibition, and we noticed there many articles to which we have beforetime drawn the attention of our readers. Among these we may mention, under the head of ventilating appliances, the specialities of Mr. Banner and Messrs. Boyle and Son of Glasgow and London; Mr. Stevens' exhaust chimney top and ventilator, as also his useful air-inlet ventilator; and Ellison's patent conical ventilators and perforated bricks, grates, and skirtings; his air diffuser and his improved valve.

The show of closets included those of Messrs. Capper, Son, and Co. of London, known as Pearson's twin basin pattern, the Eddystone and plug-valve closets of Messrs. Smeaton and Sons of London, and the closets of Mr. Bostel of Brighton and London. These, and a closet by Messrs. Brazier and Son of London, all attracted great attention, and some improvements are evident in some of the samples since their last exposition. In respect of filters, we may mention with approval the high-pressure filters of Messrs. Halliday and Co., Manchester and London, for attachment to the main service pipe, the 'filter rapide' of Mr. Maignen of London, so easy to cleanse, and a rapid household filter, exhibited by Mr. Sinclair of London, which takes the form of a pillar in some cases, as well as of a form easily fastened to an ordinary tap, were admirable.

Considerable interest was exhibited by the various visitors in the self-acting gas valve or governor of Mr. Sinclair, known as the 'Stott' governor, which appears not liable to get out of order in any way, and is perfectly automatic in its action. It is worth the attention of all consumers of gas. The form of gas stove and kitchener displayed by Messrs. Beverley and Wylde of Leeds, with its compact form and economy of burning, was also greatly admired, as was also the treasure cooking range of Mr. Constantine of London, and its companion, a very well-designed balanced gridiron grill stove, etc., by Mr. Clarke of London, were duly honoured by the passers by. One of the most important exhibits was the heating, lighting, and ventilating lamps and stoves of Messrs. Ritchie of London, and these will be fully described hereafter.

In the matter of baths and water heaters there was a good display, amongst which could be noticed the 'Shanks' combined bath, exhibited by Messrs. Wells and Co. of London, and the porcelain bath, manufactured in one piece by Messrs. J. Finch and Co. of London. Chief among the water-heaters in the museum was the 'Crown' heater of Messrs. Ewart and Son of London, which produces hot water in a minute after lighting the gas, and produces boiling water within four minutes.

One of the most important exhibits was certainly that of the patent syphon valve, for flushing out closets, urinals, and drains. This is the invention of Braithwaite of Leeds. There are many adaptations of the syphon in flushing boxes and water waste preventers, but this is the simplest for use in conjunction with a closet. There appears also to be a great desideratum supplied by the fat intercepter of Messrs. Brazier and Son of London, which prevents the choking of drains by grease.

We did not notice anything very special in the way of traps, perhaps because invention in this respect is at its wit's end; but we must refer to the appliances of Mr. Jewell, exhibited by Messrs. Carsley of London. These goods are made from Barff's incorrodible iron. There was a curious kind of improved bell-trap, however, exhibited by Mr. Wilson of London, which prevents the trapping portion of the trap, viz., the bell, from being removed when the trap is cleaned out. If the bell-trap is at all desirable, certainly every bell-trap ought to be formed on this model.

It would of course be impossible for us to notice many very praiseworthy exhibits in Classes VII and VIII, inasmuch as they are more suitable for a building treatise, and we may have done but scant justice even to many purely sanitary goods. Still we have indicated the most important of the latter, and will only say in conclusion that exhibitions of this charac-

ter are calculated to effect an immensity of good, and the more frequently they are instituted the better for the public at large.

JOHNSTON'S FLUID BEEF.

This preparation takes a very high place amongst the many extracts of beef now before the public. In its manufacture, a large proportion, 50 per cent., of albumen and fibrine of the meat are retained; so that this extract is a really nutritious and flesh-forming food. It is thoroughly assimilable, and has been found very useful in cases of chronic diarrhœa, and in the convalescence of typhoid. Of agreeable meaty flavour, and capable of being prepared in the simplest way, Johnston's Fluid Beef will be found very useful for ordinary domestic use, when a cup of beef tea or simple soup is required; we have also found it useful for enriching ordinary soup-stock, or making soup when it is required at shorter notice than is required for the usual processes of soup-making.

SLOUGH DRAINAGE.

REGULATIONS FOR PRIVATE DRAINS

(In addition to, and not in substitution for, the existing bye-laws on this subject).

1. Any owner or occupier of premises within the district who intends to cause his drains to empty into the sewers of the Sanitary Authority, shall give at least fourteen days' previous notice of his intention so to do, and such notice must be delivered in duplicate, with a fee of 5s. in each case for surveyor's superintendence, and in a form, copies of which may be obtained on application at the office of the Sanitary Authority between the hours of 10 and 12 o'clock. Every such notice and the duplicate thereof must be accompanied by a ground plan of the premises proposed to be drained, drawn to a scale shown thereon distinctly, and such plan must also show the whole of the lines of the proposed drainage, and the sizes of the proposed drain or drains figured thereon, and a section or sections of the proposed drain or drains drawn to the same horizontal scale, and to a vertical scale of ten feet to one inch. The plans must also show the course of all the surface water drains upon the premises. 1A. No connection with the sewer of the Authority to be made under any circumstances, except in the presence of the surveyor or other authorised officer of the Authority, and at an agreed time, of which not less than one day's notice in writing shall have been given to the surveyor. 2. Every house, building, yard, court, and premises, the drains from which are to empty into the sewers of the Sanitary Authority, shall be drained in the most effectual manner which may be practicable, and every drain intended to communicate with a sewer of the Sanitary Authority shall be constructed with glazed socketed circular stoneware or fire-clay pipes of approved size and quality, and shall be connected with such sewer in such manner, at such level, and with such fall as the Sanitary Authority or their surveyor shall direct, and shall not pass beneath any dwelling house where any other arrangement is in the opinion of the Authority practicable. 3. The pipes shall be laid with water-tight cement joints, and in bad ground they shall be laid on concrete, to prevent settlement and the consequent breaking of the joints and connections. No right angled junctions, either vertical or horizontal, will be allowed to be formed, but all junctions shall be formed on a curve. 4. A properly constructed trap shall be placed on the line of drain between the house and the public sewer, with a suitable ventilating pipe or opening to the drain on the house side of such trap. 4A. Every drain shall also be ventilated by a suitable pipe carried upwards, with tight joints from its highest point, and not less than two inches internal diameter. Pipes used for rainfall shall not be also used as ventilators. 5. Every drain shall be arranged so as to be kept at all times free from deposit; and if in any case this cannot be effected without flushing, it shall be necessary to provide special flushing arrangements, so as effectually to remove all foul matter from the house drains to the public sewers. 6. No person will be allowed to interfere with a road or footpath under the control or management of the Sanitary Authority for any purpose mentioned or referred to in these regulations, except with the consent of the Authority, and in the presence of their authorised officer, and upon signing an undertaking to make good any damage done; and to maintain the same for three months from completion of the work. 7. Every water-closet in a house, the drains from which are intended to communicate with a sewer of the Sanitary Authority, shall be connected directly with a sewer constructed for the purpose of receiving sewage; and every such water-closet shall be provided with a separate cistern or other water-supply to the satisfaction of the Authority, but the overflow pipe from such cistern shall in no case communicate with the same sewer. 8. No cesspool will be allowed to communicate with a sewer of the Sanitary Authority, nor will a cesspool be allowed by the Authority for the drainage of a house and its appurtenances, in any case where there is a sewer of the Authority within 100 feet of any part of the house, and available for the purpose. 9. In no case where a drain is made to communicate with a sewer of the Sanitary Authority shall any communication be made between the sewer and any cesspool upon the premises drained; and to insure a compliance with this regulation, any previously existing cesspool upon such premises shall, immediately upon the communication with the sewers of the Authority being completed, be emptied, deodorised, and filled up with suitable material, or securely domed or arched over, and in every case all means of communication between any such cesspool and a sewer of the Authority shall be effectually stopped up to the satisfaction of the Authority. 10. In any case in which it shall appear to the Sanitary Authority that the dampness of the site of any house, building, or premises proposed to be drained into a sewer of the Authority, renders it necessary to drain the subsoil of the premises, the drains from such premises shall be so constructed, either with additional earthenware pipe drains or otherwise, as to drain the subsoil of such premises. Provision shall be made for conveying rainfall from the roofs of houses and other buildings, so that such rainfall shall not be conveyed into the sewers constructed for the purpose of receiving sewage. 11. No sink or impure water, suds, slops, or foul refuse shall be conveyed into the gutters in the public streets, or into a surface water drain of the Sanitary Authority. 12. The whole of the works of and connected with the making of communications with the sewers of the Sanitary Authority, whether such works be specifically referred to in these regulations or not, must be done in accordance with the plans and sections, and in a good workmanlike and substantial manner, and shall be subject to the control and be executed to the satisfaction of the Authority or their authorised officer. 13. All excavations must be carefully timbered where directed by the Authority, their surveyor, or other authorised officer, and under the same direction proper precautions must be made to prevent any foreign matter entering any sewers of the Authority that may be open for any of the purposes contemplated by these regulations. 14. No drain to have a less fall than 1 in 40, where practicable. 15. All inlets to the drains or openings for ventilation shall be efficiently protected by gratings or otherwise, to prevent the introduction of improper substances. All inlets shall be properly trapped, except where left open for ventilation of the drains. In the case of inlets or openings used for ventilation or disconnection, every such grating or protection should be so arranged as to have a free air space of at least twelve square inches in the case of four-inch pipes, and of twenty-five square inches in that of six-inch pipes and gullies. 16. Every water-closet and slop sink for urine shall be efficiently trapped by a suitable trap. The soil pipes from all water-closets and waste pipes from slop sinks for urine shall be ventilated to the satisfaction of the Authority. 17. No overflow or waste pipe from any cistern or rain-water tank, or from any sink or slopstone (other than a slop sink for urine), or from any bath or lavatory or safe of a bath, water-closet, or lavatory, shall pass directly to any drain, soil pipe, or trap of a water-closet; but every such pipe shall be disconnected therefrom by either itself passing through the wall to the outside of the house, and discharging with an end open to the air, or by delivering into a pipe which so passes and discharges. All overflow or waste pipes shall be properly trapped, except in particular cases, where their ends discharge in such a position that the passage of foul air to the interior of the house through such pipes from drains, disconnecting traps or ventilator pipes, is rendered impossible. 18. There shall be no gully inside a house in cellars or basements or otherwise unless absolutely necessary. Where such gully cannot be avoided, it shall be properly trapped, and the outlet pipes shall not pass directly to any drain or sewer, but shall be disconnected therefrom by passing through the wall to the outside of the house, and there delivering with an end open to the air over a suitable trap, except in cases where, in the opinion of the Authority, such arrangement is impracticable.

Plans drawn to scale, showing the method in which connections have to be made, in accordance with the preceding regulations of the Authority, are deposited in the Local Board Office, Mackenzie Street, Slough, and may be inspected by ratepayers on application to the surveyor of the Authority. The forms of gullies, etc., approved of by the Local Board of Health are to be seen at the Board Office.

CHAS. THOS. PHILLIPS, Clerk.

Office of Local Board, Slough, 1880.

The attention of the ratepayers is especially called to the following sections of the Public Health Act of 1875:—Sec. XXI. The owner or occupier of any premises within the district of a Local Authority shall be entitled to cause his drains to empty into the sewers of that Authority, on condition of his giving such notice as may be required by that Authority of his intention so to do, and of complying with the regulations of that Authority in respect of the mode in which the communications between such drains and sewers are to be made, and subject to the control of any person who may be appointed by that Authority to superintend the making of such communications. Any person causing a drain to empty into a sewer of a Local Authority without complying with the provisions of this section shall be liable to a penalty not exceeding £20, and the Local Authority may close any communication between a drain and sewer made in contravention of this section, and may recover in a summary manner from the person so offending any expenses incurred by them under this section. Sec. XXIII. Where any house within the district of a Local Authority is without a drain sufficient for effectual drainage, the Local Authority shall by written notice require the owner or occupier of such a house, within a reasonable time therein specified, to make a covered drain or drains emptying into any sewer which the Local Authority are entitled to use, and which is not more than 100 feet from the site of such house; but if no such means of drainage are within that distance, then emptying into such covered cesspool or other place not being under any house as the Local Authority direct; and the Local Authority may require any such drain or drains to be of such materials and size, and to be laid at such level, and with such fall as on the report of their surveyor may appear to them to be necessary. If such notice is not complied with the Local Authority may, after the expiration of the time specified in the notice, do the work required, and may recover in a summary manner the expenses incurred by them in so doing from the owner, or may by order declare the same to be private improvement expenses.

ORIGINAL PAPERS.

COUNTY BOARDS.

AN ADDRESS DELIVERED AT THE ANNUAL SANITARY CONFERENCE OF THE SOCIETY OF ARTS, JUNE 10TH, 1880.

BY ERNEST HART,

Chairman of the Parliamentary Bills Committee of the British Medical Association, aud Chairman of the National Health Society.

THE Society of Arts, in my opinion most opportunely, has decided to propose, as one of the questions to be discussed at its Annual Public Health Conference of this year, the constitution and attributes of County Boards. No debate on this subject would be complete without a reference to the arduous and long-sustained labours in this regard of the Joint Committee of the British Medical Association and Social Science Association, under the guiding care of Dr. A. P. Stewart. I propose therefore, as briefly as I may, to indicate the opinions at which that Committee, after a most careful and laborious study of the subject, has arrived on the subject of County Boards.

Probably most of those here present are aware that it was mainly at the instance of this Committee (the original formation of which was the happy idea of Mr. G. W. Hastings, M.P.) that the Government of the day was induced to recommend to Her Majesty the appointment of the Royal Sanitary Commission. This being matter of history, I need not descant upon it at length; nor need I refer to the valuable assistance which was acknowledgedly given to the Royal Commission by the Committee. I may proceed at once to the extremely interesting and exhaustive paper commenting on the report of that Commission which was drawn by the Joint Committee for presentation to the annual meeting of the British Medical Association in 1871. In this report I find the following instructive and weighty passages, which, read by the light of the occurrences of the last nine years, are amply proved to have been true prophecies of evil.

'We observe that the Commission proposes to preserve and confirm, nay, even to augment the number of, existing *local board* districts, under what are called 'urban' authorities; the minimum population of these districts being fixed at 3,000. Now, it is well known that petty elective authorities in small separate districts are apt to obstruct rather than forward sanitary improvement, and that for the most part they render any uniform and efficient system of administration almost impossible. This fact would, we believe, have been established indisputably by proper local inquiry. Estimating the number of local board districts from Parliamentary returns—we may reasonably conclude that the surface of the country would soon be, if it be not now, honeycombed by not fewer than 1,000 limited and isolated areas under 'urban' authorities.* *Against such a project of local government, we strongly and earnestly protest.*

We infer, not only from the evidence taken in this enquiry, but from well known facts, that 'intermediate authorities', consisting of members not liable to be swayed by petty interests and sordid views, would be essential, on social, sanitary, and economical grounds, for the higher purposes of sanitary administration. And, inasmuch as the authorities of counties have already to administer and enforce the law, to control institutions, to appoint officers, and to execute functions connected more or less with the health and safety of the people, we deem it highly desirable either that the powers of the magistracy (an existing authority) should be extended so as to comprehend the care of the public health, or that boards representing the magistracy and rate-payers in due proportion should be constituted for the direction and control of local sanitary administration. The magistrates would, of course, continue to sit as *ex officio* members of the boards in 'rural' districts. It is no less reasonable and desirable that, if the division into 'urban' and 'rural' is to be maintained, they should take the same position on the future boards for the sanitary management of urban districts. *We believe that the constitution, mode of election, and duties of local boards, whether for urban, suburban, or rural districts, should be uniform throughout the provinces of England.*

There is no question of graver import or requiring greater attention than that of the compulsory acquirement of land by local authorities for certain purposes essential to the improvement of the public health. In what manner and on what conditions local authorities —whether those of large towns or those which might act over larger areas—should be empowered to provide *sites* for dwellings of labourers and artizans where densely populated parts of towns have been or may be demolished for purposes of public health (*e.g.*, under Mr. Torrens' Act)—whether such authorities should be empowered to acquire land for burial-grounds and mortuaries, for hospitals for fevers and other pestilences, for disinfecting establishments, for public slaughter-houses, for recreation-grounds, as well as for water-supply and for sewage utilisation—these and other like questions require the most careful consideration.

For all these purposes and many others, involving both appeal and compulsion, an intermediate authority to consider and report on applications of local authorities would be invaluable. And, moreover, we cannot too strongly urge on the Legislature the necessity of limiting the powers and functions of the central authority within the narrowest bounds consistent with effective action. Not only should local impatience of interference be considered and obviated by constitutional means, but a suitable authority, intermediate between the local and central, should be constituted in every county or sufficiently large area, as likely to be more cognisant of the wants and circumstances of every smaller district, and better able to judge of minute details inseparable from the daily working of Local Boards, than a government inspector.'

The last important reason adduced by the Committee for wider administrative areas was, that they would supply a superior machinery for the appointment of scientific officers, whether medical or engineering, of high and special qualifications.

The Committee then proceeded to argue with great force against the illogical and unsatisfactory method in which the Commission proposed to provide for the appointment of health officers (a policy since carried out with aggravated evils by the Local Government Board), and insisted upon the importance of the duties of such officers. They adopted the opinion of the General Board of Health that 'the occupation of a medical officer of health will not usually be inconsistent with his devoting a portion of his time to certain other professional engagements; but, where possible, it will be well to debar him from

* This estimate has been proved to be singularly accurate. There are now as nearly as possible a thousand urban sanitary districts in England and Wales. E. H.

the private practice of his profession :—first, because the claims of such practice would be constantly adverse to those of his public appointment, the duties of which (especially at times of epidemic disease, when his official activity would be most needed) private practice could scarcely fail to interrupt and embarrass ; secondly, because the personal relations of private practice might render it difficult for him to fulfil with impartiality his frequent functions of complainant ; and thirdly, because, with a view to the cordial goodwill and co-operation of his medical brethren, it is of paramount importance that the officer of health should not be their rival in practice, and that his opportunities of admonitory intercourse with sick families should not even be liable to abuse for the purposes of professional competition.'

For these reasons, and for several others which will be found in their report, the Committee proposed, 'That the right of separate appointment, by municipalities, of chief health officers should be limited to large cities and towns, the authorities of which might be willing (as in Liverpool) to render their health adviser independent of private practice by a salary which shall, in the judgment of the central authority, suffice to secure the devotion of his entire time and thought to his public duties. All other towns would enjoy the advantage of superintendence by an officer of the same high class, appointed by a county or other intermediate authority. *The system should be uniform throughout the country.*'

Another important reason for the appointment of County Health Superintendents, equally independent of private practice and of local caprice, may be here incidentally referred to. It cannot be doubted that a grave difficulty in the way of the complete registration of infectious disease throughout the country is the fact that in the majority of sanitary districts, as at present constituted, the Medical Officer of Health, to whom all notifications of the existence of infectious cases must of necessity be referred, is a practising physician as dependent upon local patients as those practitioners who would have to report their cases to him. The reluctance of these latter to assent to such an officer becoming acquainted with the nature and extent of their practice can easily be imagined ; and it would seem worthy of consideration whether the compulsory appointment of independent Medical Officers of Health, should not proceed *pari passu* with the compulsory registration of infectious sickness.

On this point the Joint Committee reported, 'While we perceive with satisfaction that the Commission recommends the registration of sickness, we doubt whether the method thereof should be wholly left, as proposed, to the Registrar-General, without insisting upon the necessity of considering in the first place the sanitary needs of the localities from which the returns are collected, and in which they ought to be promptly applied to local sanitary action. It is in regard of this function that a skilled and comparatively independent Officer of Health becomes indispensable. A proper machinery for the local revision of mortuary and sickness returns, by a skilled and independent officer, would be provided by vesting the appointment of the chief health officers, debarred from private practice, in intermediate authorities ; and to county justices, it may be observed, the legislature has committed the appointment of public analysts.'

Another subject proposed for discussion by the Society of Arts, viz. : that of the advisability of strengthening the administrative organisation of the Local Government Board, was dealt with by the Committee. They reported, 'It is obvious that, with a sufficient corps of chief health-officers, the inspecting staff in immediate connexion with the central authority need not materially, if at all, exceed the number now actually employed by the various central departments, which are to be consolidated, we hope, under one Minister of Health. Without a body of superior health-officers, *either* many necessary duties of superintendence and inspection must remain unperformed, *or* an equally numerous body of district inspectors, under the central authority, must be appointed to execute them, at a great national cost.

'Confining our remarks to the existing inspectorates, we heartily agree with the Sanitary Commission, that simplicity and economy alike demand their union under one chief, and their redistribution in *circuits*, analogous to the registration divisions, or the districts of Poor-law inspectors, which circuits might constitute the larger public health areas, except for any special purpose, as the control of river basins. In every such circuit it might be advisable, for efficient administration, that the central authority should act through *three* inspectors, with different qualifications —one legal, one engineering, and one medical or scientific. . . .

'What seems to us the fatal objection to the scheme of sanitary administration proposed by the Commission [which was, it is to be noted, carried out almost in its entirety by Mr. Stansfeld], is that it presupposes the frequent intervention of the central authority and its officials, not only in the great movements of the sanitary system, but in many minute local details. It is to be worked—or at least regulated—from the centre, by inspectors who, not necessarily residing in the districts which they superintend, cannot know more of local circumstances and peculiarities than they can glean during brief and hasty visits. This mode of administration has the threefold disadvantage of being costly, of being inefficient, and of keeping the country in a state of perpetual tutelage. If, on the other hand, the inspectors, or rather chief officers of health, highly trained in all the departments of public medicine, were resident in their districts, each one of them would be a centre of instruction whence sound and enlightened views on all sanitary matters would emanate, so as gradually to enlighten the public mind, stimulate local action, and reduce to a minimum the need of interference by the central authority.'

When the Public Health Bill was introduced into the House of Commons by Mr. Stansfeld in 1872, the Joint Committee made strenuous efforts to get recognised the important points dealt with in their report for 1871, but unfortunately with but little effect. On April 8th, 1872, a large and influential deputation waited upon Mr. Stansfeld to present a memorial expressing the views of the Joint Committee on the subject. In this memorial the establishment of County Boards was forcibly urged, and in the subsequent addresses to Mr. Stansfeld of the late Dr. Rumsey, Mr. Michael and Dr. Stewart, this point was strongly brought out. Mr. Stansfeld, however, was not convinced, and the Bill became law without any of the desirable amendments of the Committee being adopted. No opportunity occurred for the useful interference of the Committee until 1876, when it was thought expedient to convene a Sanitary Conference to consider the subject of the necessity for furthering sanitary legislation. This Conference was held on the 11th and 12th of May, 1876, under the presidency of Lord Aberdare, when much important information and many valuable suggestions were

elicited. The Committee reported in their Annual Report for 1876 that 'the general agreement manifested as to the propriety of abolishing the distinction between urban and rural districts; the expediency of having one law for the whole area, and only one authority clothed with sufficient powers for all purposes of local government in each subdivision of the country; the necessity of large areas; the appointment of County Boards; and the importance of weekly returns of sickness; and of having, for the large towns and for the larger areas of counties, officers entirely devoted to their public duties, was as remarkable as it was satisfactory and encouraging.'

At this Conference a series of resolutions were passed: and as they are of a very important and suggestive nature, I reproduce them here in full.

'1. That the existing division of the country into urban and rural districts does not enable local authorities to fulfil their obligations in the most effective manner.

'2. That the same sanitary laws be applied to the whole area of the country without distinction.

'3. That in any reconstruction of local areas it is desirable to keep in view the advisability of securing one subdivision of the country for sanitary and other purposes of local government, such subdivision to be, as far as possible, on the lines of the existing municipalities, unions, and counties.

'4. That, in the opinion of this Conference, it is desirable that a Commission be appointed to consider and readjust, with the concurrence of the Local Government Board, the boundaries of the existing districts, or any new districts to be hereafter formed.

'5. That the appointment of a County Board, consisting partly of elected members and partly of others nominated by the Court of Quarter Sessions, is desirable.

'6. That the duty of such County Boards, so far as they relate to sanitary matters, should be to exercise a control over the salaries and dismissals of the officers of local boards not being municipal boroughs; to hear appeals from one portion of a district against the decision of their board as to the incidence of expenditure for works of only partial advantage, and to undertake the conduct and supervision of such works as from their nature and expense cannot be undertaken by separate local boards.

'7. That the powers and machinery at present possessed by local sanitary authorities are inadequate to the purposes for which they are intended; especially, but not solely, in respect of means for preventing the spread of disease from the want both of early information of its existence, and also of the means of checking its progress; from want of power to prevent the erection of houses on unhealthy and improper sites, and to secure in certain cases due provision of water; and from want of means to acquire with sufficient facility and economy land for public purposes.

'8. That the incidence of taxation for sanitary and other purposes of local government should, as nearly as possible, be proportional to the direct benefit accruing to the several parts of the districts.

'9. That the officers of sanitary authorities should, so far as is practicable, be restricted from other than the official duties for which they are specially engaged, and that in order to promote this object it is essential that the area of supervision should be made as large as can be efficiently worked.

'10. That a health officer or assistant should, where it is practicable, be appointed (*a*) to every Local Government District, or combination of districts, such districts to be constituted, as to area and population, as already suggested; and (*b*) to every county.

'11. That the several officers should be in communication with each other, and with the health officer especially attached to the County Board.

'12. That the salaries be such as to ensure the services of first-class members of the medical profession, devoting themselves entirely to the health-service of the country.

'13. That it is desirable in future to appoint, at least to the higher offices, men who have passed an examination in State Medicine.

'14. That the above regulations are equally desirable in the cases of surveyors and inspectors of nuisances, so far as they are applicable.

'15. That, in the opinion of this meeting, the powers of the Public Health and other sanitary Acts which are of a permissive character should, as far as practicable, be made compulsory.'

A memorial embodying these views was prepared for presentation to the then Prime Minister; but Lord Beaconsfield expressed his inability, on account of the pressure of business, to receive the deputation that proposed to present it. In 1878, however, when the County Boards Bill was introduced by the Government, the Joint Committee made another attempt to revive the subject by preparing a memorial with a view to its presentation by an influential deputation to Mr. Sclater Booth. The great opposition in the House, and also throughout the country, to the details of the measure, led to its withdrawal, and the Committee contented themselves therefore with forwarding a memorial in which their views on the subject were expressed.

During the Session of 1879, public interest was so engrossed with other questions that there was no opportunity for profitably discussing this important matter; but now that a new Government, pledged to improvement in domestic legislation, has come into power, it cannot but be regarded as most opportune that the Society of Arts should revive the question of County Boards. In thus giving a sketch of the labours of our Joint Committee, I have been desirous to bring forward points upon which the Committee, which comprises amongst its members men of the highest rank and attainments in the sanitary world—has come to a deliberate decision after most carefully weighing the evidence on the subject. I cannot but think that the discussion which we shall be privileged to hear on this occasion will tend very greatly to strengthen the hands of the Committee, and to expedite in a marked degree the reforms for which it has so long and earnestly striven.

SANITARY NOTES.

By J. Lane Notter, M.D., F.C.S.,

Diplomate in State Medicine, University of Dublin; Assistant Professor of Military Hygiene in the Army Medical School.

II.

Moisture in Soil.—In discussing the question of air in the soil, we have made frequent reference to the permanent ground-water as being the principal motor power in inducing changes in the ground air, and, as this part of our subject is one of special importance, we shall dwell on it somewhat in detail, even at the chance of wearying our readers. To the ground-water does Pettenkofer attribute almost entirely the presence of typhoid fever, which may fitly be called the plague of our English homes. Could we but banish this one disease from our midst, what

a triumph it would be for sanitary science. By ground-water we must be understood to mean, water continuous as such in the soil. It must not be confounded with dampness, which is quite different; indeed, this latter is often mainly due to evaporation from the former. The ground-water has a regular ebb or flow, which generally tends towards the sea at a certain undetermined rate, but estimated by Pettenkofer to be about 15 to 20 feet daily, depending on the dip or strata, and on the porosity or otherwise of the soil. Its level is not constant, but is subject to the time of year and place, to the rainfall and the relation of the locality to rivers and water-courses, to the configuration and permeability of the soil, and, to a less extent, to the temperature. It is from this source that wells derive their supply of water, and if these are numerous and largely drawn from, they lower the level of the permanent ground-water. A good example of this is afforded by the sinking of the ground-water, and drying up of wells consequent on the incessant pumping it was necessary to carry on while excavating for a foundation for the new docks at Chatham, and which had a considerable effect on the ground-water at some distance from the works. Moisture or dampness in the soil simply means the water which exists in contact with the air in the soil, and requiring heat or some other means to separate it, and we shall presently show that, among the various conditions which influence health, it, too, plays no unimportant part. This moisture increases, *pari passu*, with the ground-water, while the latter depends in a great measure on the rainfall, and the amount of rain which falls over any area is of importance in estimating the healthiness or otherwise of a district. Of the rain which actually falls, nearly two-thirds passes back into the atmosphere, while the remaining portion percolates into the ground to swell the current of the ground-water and flow away to reach the sea in its ordinary course. The increase or diminution of evaporation over percolation varies with the quality of the soil. In this country about 25 per cent. of the rain percolates into the sand rocks, 42 per cent. into the chalk, and from 60 to 90 per cent. into the loose sands. (Parkes, 5th ed., page 330.)

A series of investigations has shown that the mean annual temperature of drained land is raised nearly one degree by drainage. The temperature of hill-pasture is also raised by drainage, but not to the same extent; and when the temperature of the air is higher than that of the soil, drained land receives more benefit from the higher temperature than undrained land, less of its heat being lost by evaporation. It is the presence of dampness which renders soil cold, as, for instance, the humus soil, which holds as much as 60 per cent. of water. All soil contains a certain amount of moisture, though some hold so little that they are said to be impermeable. Practically, we find the amount so small that this definition may be accepted. The moisture is equally dependent on the rainfall as its chief source, though it is also largely due to evaporation from the ground-water. It will be increased or diminished by the rise and fall of the latter, and by the ascent of the particles of water from its surface by capillary attraction which will, of course, be influenced by the nature of the soil and the superficial strata.

Now, of these two conditions under which we find water in the soil, the permanent ground-water, or, as it is sometimes called, the subsoil water, is by far the most important, for the dampness is a secondary product, arising in a great measure—though not entirely—from the evaporation going on from this subterranean sea. No fact has been proved more conclusively of late years than the greatly increased healthiness of a drained soil which has a permanently low water-level, while a permanently high water-level is most injurious. But of all conditions which appear to be the most unfavourable to health, a fluctuating ground-water certainly bears the palm. It would appear as if the organic matter in the soil had, so to speak, been revivified by being surrounded by moisture, and when once again dry and fed with air drawn into the soil by the lowering of the ground-water, air probably of a higher temperature, extracted from the basement of houses by the aspirating effect of the receding water, all the conditions necessary for a new growth present themselves, and, as a result, we have a high rate of sickness and a corresponding mortality. Moisture is absolutely necessary to allow organic matter to undergo change—in other words, to permit decomposition to take place. In a perfectly dry atmosphere there is little or no decomposition, simple decay, or a process of slow oxidation taking its place; and if the organic matter is of animal origin, it mummifies. If, for instance, we extract the water from fresh meat, and protect it from damp, we can keep it for almost an indefinite time; or again, if, as in Canada, the meat is frozen, that is, that its moisture assumes a solid form in the shape of ice, we are enabled to keep it for months without any fear of change; on the other hand, a damp cellar is a fruitful source of trouble, and when used from necessity the meat and other articles which are likely to be affected have to be taken out and dried, and this is within the experience of most people. If, then, ground-water cannot be permanently lowered, our great aim should certainly be to limit its range of increase and decrease, to reduce to a minimum these conditions, which not only set the organic matter into an active state, but also to limit the exhaling power of the earth, and thus prevent the seeds of disease being thrust into our dwellings and houses. The effects of damp are often manifested by colds and rheumatism, and a fluctuating ground-water is laid down by Pettenkofer as being one of the chief factors in cholera and typhoid fever. From the results of the investigations published by this distinguished physician there does appear, at all events at Munich, something more than a passing connection as regards typhoid fever, though we must state that the theory advocated by him that the same cause produces cholera is certainly not borne out by the researches of Drs. Cunningham and Lewis in India. It would also appear, according to Pettenkofer, that the other conditions necessary for the production of this fever besides a rapid sinking of the ground-water after an unusual rise, are impurity in the soil from animal impregnation, heat of the soil itself, and the entrance of a specific germ.

No inquiry has elicited greater or more important truths than that Dr. Buchanan has recorded, a summary of which is given in the Tenth Report of the Medical Officer of the Privy Council, as the result of his investigations, and the statistics which he quotes are of the utmost importance. He there tells us that, in the towns named, the fall in the number of deaths from consumption per cent. was as follows: Salisbury, 40; Rugby, 43; Banbury, 41; Ely, 47; Worthing, 36; Leicester, 32. His inquiries extended to fifteen towns, all of which bore equally satisfactory evidence of the benefit which accrued

from permanently lowering of the subsoil water. We have also to remember what an exceedingly common disease consumption is, and the many who fall victims to it at an early age. The mortality, even under improved circumstances, in all England averages nearly 4 per 1,000 of the population; and from the evidence furnished to us in Mr. Simon's valuable reports, we are bound to admit the possibility of reducing this by at least one half. Hereditary tendency plays a very important part in the history and development of consumption. Still we cannot be oblivious to the fact that there are many exciting causes which it is in our power to avoid, and chief amongst these is a damp site. From what has been already stated, it is easy to conceive that a permanent high ground-water will cause a moist and cold atmosphere, nor must we forget the fact of so much heat being actually destroyed by the processes of evaporation which are constantly going on from these soils. A high mortality in chest-diseases is always associated with a low temperature, so that a wave of cold air, in passing over an area, will cause among the sick and weakly a large number of deaths. The power of resisting the bad effects of damp air appears to be least in infancy and childhood, gradually increasing until middle life is reached, and declining again with old age.

There are so many instances recorded where consumptive cases have benefited by change to a dry and mountainous climate, where it is evident the disease has been kept under, not by the increase in temperature, as is popularly supposed, but chiefly by the absence of moisture in the air; and, as it is evident that the majority of persons who have a tendency to this complaint are unable to seek out and go to a climate abroad which has a reputation for the partial cure of these most distressing cases, we most unhesitatingly assert that drying the soil by proper subsoil drainage is of the utmost importance, and tends to lengthen life and diminish disease more perhaps than any other circumstance. And although some soils appear to afford an immunity from certain diseases, as, for instance, it is asserted, that in some places cholera is infrequent on granite, metamorphic, and trap rocks (Parkes), though this may be true for cholera, certainly, it would appear that local conditions and filth have more to do with the spread of this disease, and are of far more importance than the soil; for we know as a fact that cholera epidemics in England bear no relation whatsoever to the soil itself, but are much more intimately connected with the water-supply and drainage.

Solid Constituents in the Soil.—It will be less confusing and more convenient for our purpose to hold to the division of soils into permeable and impermeable. These are subdivided as follows:—Permeable—chalk, sand, sandstone, vegetable debris. Impermeable—unweathered granite, trap and metamorphic, clay, slate, dense clays, hard oolite, hard limestone and dolomite.

Sands and gravel soils are only healthy when they are kept free from sewage matter, and drainage provided to avoid an excess of surface water. Drift gravels or the deep permeable gravels are not open to the same objection, but they certainly have little or no effect in purifying the organic matter which passes through them, and we may affirm the same of sandy soil. These soils all allow organic matter to pass readily through them, and flow away to rivers and lakes by the channels of natural drainage. It is only when they are shallow, and rest on a hard impermeable strata, that they are unhealthy, for then they hold the organic matter poured on their surface in the form of sewage and slop water, and become impregnated with filth like a sponge, and their power of oxidising is extremely small compared with other soils. The sewage impurities cast on such a soil are sure at no distant date to find their way once again to the surface, and this is one of the most common forms of well-poisoning. Shallow wells sunk through a porous soil, resting on an impermeable stratum at no great depth, are sure to derive the supply of water simply from rain and surface washings, which, sinking through the soil unaltered as regards their chemical qualities, almost entirely find ready access into such wells; and in villages the drainage of cesspits or 'dead wells'—rightly so named, for they seldom tell what mischief they can do, until this mischief is done—all find easy ingress to the 'living well', which supplies too often disease as well as water. This is not the case with clay soils, which perchance may be colder and moister, but which will certainly rid the filth poured out on its surface of its organic matter, and not return it in the same condition as it receives it. The unhealthiness of a clay soil is certainly caused by the presence of moisture, which renders it cold; and for this reason, when we have a choice, it may with propriety be avoided for a better one; but under certain conditions, and with proper means, we believe, clay soils can be made healthy enough. In such a case the foundations should be built on concrete, and the subsoil water lowered and permanently drained, and if such a plan is adopted there need be no apprehension of evil results of any kind. The main facts to remember are, that unless extra precautions are taken the subsoil should be porous, that retentive soils, and especially shallow gravel and sandy soils resting on an impermeable stratum at no great depth from the surface, ought to be avoided.

The following Table shows the relative healthiness of soils.

	Slope.	Permeability to water.	Emanations into air.	Substances in water.
Primitive and Metamorphic rocks when unweathered	Great, usually	Slight	None	Few.
Clay slate	,,	,,	,,	,,
Milstone grit, hard oolite	Moderate	,,	,,	,,
Gravel or loose sands without impermeable subsoils	Slight	Great	Slight	Variable.
Chalk, not marly	Moderate	,,	,,	Lime, salts, & magnesia.
Sandstones, old and new	Considerable	Variable, but usu'lly considerable	,,	Variable, alkaline, & earthy salts, organic matter.
Magnesium limestone, dolomite	,,	Moderate	,,	Lime, high.
Sandstones with impervious subsoils	Slight	Arrested by subsoil	Considerable	Lime, alkaline salts, &c.
Clays	,,	Slight	,,	Organic matter, alkaline, salts.
Marshes, not peaty	,,	,,	,,	Great —Salts, organic matter, &c.

Presence or Absence of Vegetation.—When we consider the subject of cultivation of the soil as relating to the site, we have but one view to take, and that is, that vegetation can only be considered productive of good results, provided it is carefully attended to, and kept within certain limits. In any climate, and under any circumstances, the exuberant growth of plants and trees is bad, especially in the tropics, where rank vegetation abounds. A familiar

example of this is given to us in the history of the Ashantee War. Whenever we find this rapid and uncared-for growth, we have a similar process of decay taking place, with all its attendant products of decomposition, poisoning the air, and rendering, by its noxious vapours and mists, the atmosphere unendurable. Nor need we go to tropical climes to witness examples of this; for instance, we find related the following incident, which bears on this subject. In a large hospital, one ward was noticed to be exceedingly injurious to invalids who were subject to previous attacks of ague; and, on carefully enquiring into the causes why this should be so, a tank outside one of the windows was discovered full of rotten leaves. This had overflowed, and formed a pool of water close under the doors and windows, which, on account of the hot weather, were kept open at night. The cause being removed, the fever ceased, and this ward differed in no degree from any other part of the hospital: a striking example of the injurious effects of allowing vegetable organic matter to accumulate and decompose. We may safely say the good effects of cultivation are manifest, and far exceed the bad. Nor must we look simply to the chemical principles alone—such as the presence of oxygen, and ozone—as being the only use we derive from plants and gardens. Plantations serve as a shade in summer, as a shelter from prevailing winds and storms, as reservoirs of heat during the night, cooling the air by evaporation from the surfaces of their leaves during the day, sparing the moisture in the soil, and preventing the wells and streams from running dry during the hot summer months; limiting likewise the fluctuating tendency of the subsoil water, and giving a grateful shade to cattle, who repay as many-fold in the quantity and quality of the milk and meat we derive, and in numberless other ways; while flowers are a source of food for bees, and afford pleasure and delight where such is most wanted. There is, perhaps, no greater source of pleasure, nor one which is more necessary to cultivate among the young, than the love of flowers, and certainly there is none more healthful, for it means freedom from filth and waste, and a pleasurable and wholesome occupation in the open air; and where flowers flourish air is always good, and light is essential. In fact, the condition of things necessary to produce a good garden are almost the same as for health; and who will not acknowledge but a study of one of Nature's best gifts will help to refine the mind, to turn many, perhaps, from habits of idleness and mischief to works of real usefulness and healthful employment. We mentioned what a powerful agent vegetation is in preventing the fluctuating periods in the ground water, which we have alluded to as being especially dangerous. Moisture in the soil is by many considered to be a cause of the spread of disease, and therefore we have no difficulty in understanding how essential well-regulated vegetation and culture is—not that the growth of trees will of necessity dry the soil. It is true that the destruction of trees will diminish the rainfall, and therefore will lessen one of the sources of ground water. But the growth of trees and plantations prevents the greater part of the moisture present from evaporating, and in this way preserves the ground from drying up. Instances, too, are quoted where places which are covered with forest plantations have escaped attacks of cholera, while a short distance off, where there was no vegetation, cholera raged, supporting to some extent the views held by Pettenkofer, that the fluctuating ground-water plays an important part in the spread of this disease; and this writer asserts that at Munich, where plantations and gardens were, neither cholera nor typhoid fever appeared, and he adds, 'If these deductions must be accepted with caution, still they indisputably tell in favour of woods and trees'. Again, we may look upon vegetation as one of Nature's most powerful means for destroying organic matter, which, when scattered broadcast on the soil, is used up, and converted into food necessary to the tissues of the plants growing on the soil. We have instances of this power of vegetation causing the complete destruction of organic matter at Merthyr-Tydvil and elsewhere, where the method of purifying sewage, under the system described by Mr. Bailey Denton as 'intermittent downward filtration', is carried out, and where sewage is applied to growing crops with a view of destroying its organic impurities—sewage of the average filthy composition of an ordinary English town—the effluent water is found to be bright and sparkling, and in some instances might well vie with samples of village well-water, a fact sufficient to prove the enormous power plants possess of taking up organic matter, and arresting it in its process of decay, thus preventing further decomposition, which can only lead to injurious results, and which may often infect air and water with their noxious products; nor can we omit to mention the great value which even in this country we derive from groves and plantations in the form of shade and coolness. The maximum temperature of trees occurs about 8 p.m. in summer. Trees therefore render the day cool, lowering the temperature of the air by the evaporation which is constantly going on from the surfaces of their leaves, and also by protecting the earth from the direct rays of the sun; but they also raise the temperature of the night, for the reason above stated, making our climate an equable one; and not the least advantage we gain from foliage is the motion it imparts to the air, giving a sensation of freshness and vigour to what would otherwise be a close and oppressive day. From what has been said, it is evident we regard healthy cultivation of the soil as almost a necessity, proving not only advantageous in a sanitary point of view, but affording a source of pleasure and health, an out-door occupation and an object which is often essential, relieving us often of the intense heat of the mid-day sun, otherwise oppressive, and rendering our nights less subject to large and sudden variations of temperature, preventing, as far as we can, the fluctuating character of the ground-water, on the other hand, sparing our wells from being dried up, by saving some moisture in the soil, destroying organic poisons almost before decomposition has set in, and preventing the spread of noxious poisons to pollute our air and water. Such are a few of the uses to which plants and vegetables are turned, and which to the sanitarian are all important.

Nor must we forget that in advocating the cultivation of land, we are also aiding in no small degree to establish a wise and healthful pleasure among all classes, and pleasure is a necessity for the poor as well as for the rich, for young and old; only cultivate a taste for flowers among children, and for ever afterwards, the garden, however small, however poor, will not only be an occupation, but a pleasurable pastime, helping often to pay the expenses of the small householder among the labouring classes, or, at all events, affording an occupation when the day's work is done. Nor are the results in a sanitary point of view less satisfactory, for with a well kept plot of ground are always found cleanliness and comfort.

It is a matter well worthy the attention of our school-boards, whether an elementary education on gardening should not be given to the young, and a practical interest attached to it, by appropriating a small plot of land (a few feet square) to a certain number, with prizes to encourage the pupils to interest them in the growth of flowers and general neatness.

The following is a brief summary of the conclusions to which the foregoing considerations point :—

In Cities and Towns.—Select an elevated site, with free space for air and sunshine, avoiding proximity to any manufactory giving off offensive emanations of any sort. Avoid made soils or undrained clay soil.

In the Country.—The same conditions hold good, but be careful not to sacrifice aspect to prospect, and avoid low grounds or valleys—these are always cold, and contain the drainage from a higher level. Drain the subsoil thoroughly, encourage the growth of vegetation, and cultivate the land near the site. A site on a porous subsoil, with a low ground-water, which does not fluctuate, situated on a slight elevation, and having sloping ground on each side, is the most healthy, provided there is some protection from the prevailing winds, and that these do not blow over marshes, brick-fields, cement works, etc. In the selection of a suitable site water-supply and drainage are of paramount importance.

TRICHINOSIS;

AND THE DANGERS ARISING FROM THE CONSUMPTION OF FLESH FOOD.*

By T. SPENCER COBBOLD, M.D., F.R.S., F.L.S.,
President of the Quekett Microscopical Club.

(*Continued from p.* 407.)

Apart from the presence of trichinæ, the question of the deterioration of flesh food from other parasites is of considerable importance. It cannot now be fully discussed. At the present time a very large number of sheep are perishing from 'rot' or coathe—a disorder produced by flukes in the liver. Constantly, therefore, one is asked the question : 'Is the mutton derived from fluke-affected animals good for food', or again : 'Is the consumption of the flesh of rot-affected sheep or cattle dangerous to the public health?' To these important queries it is desirable to give a clearly defined answer, inasmuch as there appears to be a vast amount of what I may term fussy and vexatious official interference with the rights and prerogatives alike of those who rear live animals, and of those who ultimately dispose of their carcases. Probably few amongst us have much sympathy for middle-men, whether butchers or dealers ; nevertheless, there are honest, fair-dealing people amongst them, and they ought not to be fined or otherwise punished for bringing into the market meat which they conscientiously believe to be free from all deleterious qualities; still less ought farmers to suffer. In the early stages of the disorder, rot-affected meat is absolutely harmless ; and, even in the advanced stages of the affection, when the flesh has lost its bright, carneous, rose-coloured appearance, and resilient texture, the worst that probably can be said of it is that it is comparatively innutritious. It is well known that years ago, a Mr. Bakewell gained notoriety and also much wealth by artificially 'rotting' his sheep. By this process he stole a march upon his agricultural neighbours. He sent his animals to the market five or six weeks earlier than they did, and he had no difficulty in obtaining a good price.

In the early stage of the affection the animals are voracious, and they fatten more readily than healthy ones. But we have stronger evidence bearing upon this question. Australian agriculturalists and stockowners have freely communicated to me their sentiments on this head, and some of them have solicited my advice as to the best methods of saving their flocks from the destructive epizoötics produced by these and other parasites. One of the largest flockmasters in Victoria was the late Dr. Rowe, who resided in the Goulbourn district, and who, at an early period of his career, gave up the practice of his profession for the more profitable occupation of sheep-farming. On the question of the supposed dangerous character of rot-affected or fluky mutton, as he calls it, he thus wrote : 'The mere presence of flukes in the viscera of an animal is no proof that it is unfit for human food. For inspectors of slaughter-houses to adopt such a test of wholesome food would be the greatest mistake. It would afford no protection to the public against unhealthy food, would increase the price of animals, and be ruinous to our farmers and graziers. If the consumption of fluky beef and mutton were prejudicial to the health of man, there would be very few people alive in this part of the colony ; for, to my certain knowledge, they have had no other animal food to live upon for the last twenty-five years ; and yet, for physical ability, I believe they may be favourably compared with the inhabitants of any other part of Australia.' Of course, I cannot now pursue this subject in all its bearings ; but, lest any should think that Dr. Rowe's opinion was that of a one-sided man (looking only to the interests of his class), I may mention that, on the basis of facts which I had publicly communicated, he gravely proposed to stamp out the rot-disease by burning the pasturage, by destroying all the rotten sheep, and by restocking with healthy animals. If others had only agreed to join him in the experiment, I believe there was no philanthropic sacrifice that he was unprepared to make in the hope of rendering an eventful service to the colony.

One word on the subject of the so-called unwholesome meat prosecutions which, just now, seem to be the order of the day. Scarce a week passes that we do not read of the conviction of a butcher, dealer, or farmer. In two cases the fine was £10, in another £20, in another £30, and yet in another £40. These are but samples. I can only specially refer to one of the two ten-pounders, so to say. The poor fellow, Richard Law, said in his defence that, 'if he never got worse meat to eat he should not grumble.' Perhaps there was some exaggeration in this remark, as according to Inspector Newman, the meat was in the advanced or watery stage of the disorder. Be that as it may, there is not, I believe, a shadow of proof that any real harm results from the consumption of fluke-affected meat, even in the advanced stages of the disorder ; and, certainly, Richard Law, had he kept the fluky mutton and eaten it himself (as he says he originally intended to have done) would only have partaken of food similar to that which the Goulbourn district colonists had been enjoying for the last five-and-twenty years.

Although nearly all that I have advanced tends to

* Read before the Sunday Lecture Society, April 4, 1880.

take the form of a protest against the absurd exaggerations with which the general public have of late been saturated, I dare say my friends the vegetarians, in what has been said, will discover enough of danger to stimulate them in their determined onslaught upon that very vicious habit which most of us have contracted of eating flesh-food of some kind or other. I have called them 'my friends', because I adjudge all honest people to be such; but when, at Manchester in 1874, I delivered one of the 'science lectures for the people', under Professor Roscoe's chairmanship, they made my utterances the subject of grave, not to say severe comment. In the *Dietetic Reformer and Vegetarian Messenger* for February 1874, these gentlemen are pleased to observe: 'One would expect that with all these facts before him, Dr. Cobbold would not fail to warn his hearers against such obvious dangers. But science teaches no such thing to Dr. Cobbold; it does not teach him to avoid the evil—only to take what he calls "precautions" against it. His intention seems to be, having made his hearer's flesh well nigh creep with his narratives about parasites, to make them all quite comfortable again.' Clearly, I am past praying for. They admit that the truth was told, but they object to my removing the sting which the truth conveys. If the precautions we have recommended are valueless, I certainly ought to have been an early victim; for, in addition to some fifty years of flesh-eating, I have during the latter half of this period probably handled and examined more parasites than any other person living in this country.

Well, what is the advice the vegetarians give us? We can give, say they, 'a higher certificate' than the lecturer on parasites. Avoid meat altogether. 'Abstain even from the appearance of evil.' If you follow this guidance you will possess 'a safety worth the having'. But stay, my friends! What if I can show you, and the other total-abstainers, that, in the absence of the due precautions which you so much ridicule, there are as many parasitic evils to be gathered from the consumption of vegetables and the drinking of water as arise from the eating of meat? I speak advisedly when I state that as regards the whole human race there are far more people suffering from parasitism derived from impure water and uncleansed vegetable food than from eating unhealthy meat. What was recently described in the *Times* newspaper as 'Tunnel Trichinosis' is a well-known wasting disease in warm latitudes contracted by drinking unfiltered water containing animalcules. I have called the disease anchylostomosis. The parasites after their entrance into the human body, behave like leeches, and prove very destructive. Let the vegetarians look to the logical outcome of their preposterous doctrines. The same science that dictates precautions in meat-eating, similarly advises in respect of water-drinking. Moreover, your market garden vegetables are not always so free from the sprinklings of fresh sewage and other abominations that you can in every case safely abandon the precautions of thorough washing and cooking. Properly filtered water, again, is not always to be had; and in that case, I for one should not care to be deprived of whatever good might result from the addition of a little alcohol.

In all questions of meat inspection great care should be exercised. It is not merely a farce to appoint technically uneducated inspectors, but a serious evil. From the parasitic point of view, and supposing the consumer to insist upon eating underdone meat, beef must be regarded as the most dangerous food, pork next, and mutton least. Much might be said in favour of hippophagy, seeing that horse-flesh is altogether free from parasites injurious to man.

As regards meat-inspection in the City of Dublin, we are told that 'four policemen are employed as animal-food inspectors, under the directions of a deputy clerk of the market'. I should like to know what measure of education in chemistry and helminthology these five officers have received. Under the able guidance of Dr. Cameron, who has done good service, they may possibly have had some instruction in chemistry; but in the matter of parasites and parasitic diseases I fear that their qualifications are of a very humble order. Every inspector of meat ought to be adequately instructed in the practical departments of helminthology before he is permitted, arbitrarily, to confiscate market-meat at his pleasure. It is not sufficient that inspectors and officers of health should be good analytical chemists. They ought to be good microscopists, and thoroughly acquainted with parasitic organisms, as well as with other pathological appearances that are liable to occur in the flesh of animals.

Some sensible remarks recently appeared in the *Edinburgh Medical Journal* on this subject. In a short review of Mr. Vacher's brochure, 'On the Diseases of Animals which do not necessarily render them unfit for the Food of Man', (reprinted from the SANITARY RECORD), the writer justly observes:—'It should form an important inquiry with Medical Officers of Health whether the further conservation of our food-supply in relation to disease and its effects might not be subjected to fresh and searching investigation.'

As bearing upon the question of the technical education necessary to make good inspectors, I may observe that there is an Economic Museum at South Kensington; but I believe that there are not half-a-dozen specimens or drawings showing the diseased conditions that result from parasites. I once made a proposal to supply the deficiency, but the matter fell through. I am not very sure that any particular good would result from the mere deposit of suitable illustrations there. It might be otherwise with the Parkes Museum, especially if explanatory lectures were also given. The late Professor Parkes was fully alive to the importance of this subject, as his address before the British Medical Association abundantly testified.

To conclude. I appeal to all in authority to bestir themselves. Do not allow inspectors of meat to remain ignorant in matters of vital importance. When even officers of health and skilled microscopists make mistakes, how is it possible to rely upon the statements of less educated persons? The whole system needs reforming. As matters stand, it is not possible for the most conscientious magistrate living to do justice in all the cases of meat-prosecution brought before him. It is idle to say that practical men are sufficiently well informed, when even butchers cannot discern the difference between fleshmeasles and nerve-sections. No inspector's opinion is worth a straw, unless he has been technically educated in the matter of parasites and parasitism. See what pains they take about meat-inspection on the Continent. Why should we remain behind? If there is one thing more than another on which England prides itself, it is on the principle of meting out even-handed justice to the humblest of the community. Certainly magistrates are right in inflicting severe punishment on persons who knowingly distribute poisonous flesh food, or who sell meat contain-

ing obnoxious parasites; but, to condemn salesmen and farmers on the word of persons totally uninformed as to the facts and phenomena of parasitism, is not only placing real knowledge and science at the footstool of ignorance, but is acting on a principle altogether contrary to common sense and our inborn love of fair play. At a time when the agriculturists, or at least the humbler class of farmers, are many of them 'out at elbows', is it wise to add to their distress by needless, not to say unjust, prosecutions?

In the matter of stamping out disease, a great work remains to be accomplished. Royal Institutions and Medical Colleges may close their doors against all who have the moral courage to study 'worms' and the phenomena of parasitic life; but they cannot deny the fact that every year brings fresh and cogent evidence of the supreme importance of the subject in relation to public health. Extending his vision beyond the area of this comparatively cleanly little island of ours, the instructed observer is astonished at the severity of the life-struggle going on. The uninstructed individual sees nothing. When such a person, either on the score of recognised merits of another order or of social distinction, is placed in office, however conscientiously he may act as a man of private worth, he does but contribute his mite towards the retardation of our national progress.

Though I employ figurative language, it is no more than the real truth to affirm that at the present time there are thousands of parasites securely holding fortresses, whence they issue daily in their mission of death. It is in tropical countries that they best succeed, the higher lives succumbing to the lower in this unequal struggle for existence. Not alone do people suffer, since the dangers and disasters are shared by quadrupeds, birds, reptiles, fishes, and even creatures lower in the scale. Facing such facts broadly, it may be asked, what can private efforts do to diminish the evil. The experience of some thirty years of work and correspondence enables me to say that, except by influencing and guiding others, private efforts are of little avail. Politicians are not the only people victimised by letters. I could produce a curious, not to say amusing, correspondence from persons rearing all kinds of stock, including elephants and ostriches, bitterly complaining of the destruction of their herds and pets. In one ludicrous case a titled lady seemed to feel herself aggrieved, because I could not undertake to cure her chameleons, which were being carried off by parasites infesting the lungs.

Practically there is no limit to the amount of good which remains to be effected by sanitary interference. Not only may human and animal lives be saved, but much suffering prevented. For this end, however, culture and intelligence must be made to pervade official life, not merely in the higher phases, but in the very lowest, even down to the meat-market inspector who happens at the same time to function honourably as a policeman. There are not wanting those, both in official life and out of it, who are conscious of existing defects. Let errors be candidly confessed. All of us make mistakes, and we welcome the honesty that admits a fault. The late Mr. Hinton, though writing anonymously, raised his voice in favour of our labours. He was a thinker who looked beyond the mere routine of his professional fee-taking craft. Speaking of helminthologists (in a review), he had a kind word of encouragement for the humblest unpaid worker in the rank and file of science, and he summed up the measure of his admiration for the results we have already achieved by saying: 'In the life history of these creatures, you are dealing with one of the most interesting and suggestive problems which physiology presents, and you are at the same time contributing to the accomplishment of a task which promises a boon to the human race scarcely second to that conferred by Jenner'.

P.S.—Having recently read Mr. Power's report on trichinosis, I am satisfied that the parasites described and figured in it are not trichinæ properly so-called. As regards the Thaxted outbreak I have probably erred, since I see it is now stated in the *British Medical Journal* of May 8, on the authority of Dr. Armistead, that *Trichinæ* were actually found in the sausages that gave rise to the symptoms.

HOW TO PREVENT THE SPREAD OF FEVERS.*

By Mrs. Johnstone,
Superintendent of the Sanitary Aid Association, St. Leonards and Hastings.

What I now have to say on the subject of easy and most effective co-operation with the sanitary officials of all kinds, of non-official, or *medically* professional visitors of the poor, is not of some as yet untested theoretical scheme, but of an institution with a nine years' history, an institution that has wrought (so far as it has had opportunity for its work) with complete success over a population of 35,000 people, an institution the records of which are accessible to all men. I desire to stimulate you to the examination of those records, for it is even thus—if what I shall presently state to you be true, then all the calamities and sorrows which result year by year from the fatalities of infectious fevers are preventible, and are unjustly charged upon Divine Providence. Our Creator overrules indeed all those occurrences which are the result of the ignorance or misdoing of men, but He 'made not death, for He created all things that they might have their being, and the generations of the world were healthful, and there was no poison of destruction in them, nor the kingdom of death upon the earth, but ungodly men with their works and words called it to them'. (Wisdom of Solomon, Chap. i, verses 13—16.) And now, whensoever we will exercise the intelligence that He has given us, and use the things which He has made for the restoration and preservation of health, and be content with the terms upon which He has *alone* enabled us to accomplish the extinction of disease, which are that we act *unselfishly*, each one of us for the benefit of others—I say that He permits unto us complete success, and it is worth the while, not only of you, my hearers, but of this nation, and of all nations, to examine and ascertain whether my statement to you be true or false.

The first question which, if a number of you now spoke, you would be pretty sure to ask me, would be this:—'With Medical Officers of Health, each with his Inspector at his service, why is not disinfection of all fever cases carried out without troubling anybody else?' Well, at least you admit that the published health (or ill-health) returns amply shew that only very partially is this done, and it is for me to shew you the reason, and to explain that by no fault of the Medical Officers of Health or of their Inspectors does this deficiency occur. They labour under great difficulties and disadvantages. It is to aid our Medi-

* Read before the National Health Society, April 1880.

cal Officer of Health at all the points of his deficient resources that our Association at Hastings exists, and it is to persuade you, each and all, to promote the same sort of co-operation with your Medical Officers of Health, with each in his own sphere of responsibility, that I am come here to-day. This gentleman has legal power to enforce, under penalty, certain processes of disinfection in cases of scarlet fever, small-pox, typhus, cholera, etc., *when he knows of the cases*, to hinder the actually reeking patient or convalescent from going amongst his neighbours, *when he can capture and convict him;* but who is to ensure him that no cases escape his knowledge? and that no infectious persons, between one visit of his Inspector and another, go where they ought not, and receive visitors whom they ought not? 'O, but,' say some of you, 'we send all the fever cases in our parish to the Fever Hospital.' Well and good, so much the better for all parties concerned, carry this as far as you can. But there is such a contingency as no room to be foreseen, and numbers of parishes, even in towns, have no Fever Hospital, and in the country only by rare exception is such a thing found, and my business is to exhibit a plan that is good for all emergencies, and will work anywhere.

I say do you, all of you, in your own place, stimulate your neighbours, by combined action, to get at information for your Medical Officer of Health, and bring it about that those with whom he has to do shall obey him behind his back, as well as in his presence. 'What an undertaking!' some of you may say, 'and pray how are we to discover and control the fever subjects?' Now I beg your kind attention to my answer. I shall not be able, within the time at my disposal, to give you more than specimens of the chief modes of the propagation of infection. If this paper should be published in a more extended form it will contain notes on the subject; but I may instance that in every parish, if you keep your schools healthful you will have made the most extensively important of all steps in the direction of public health, exempt from infectious fevers. All schools have their controllers, their master, or mistress. Persuade the school authorities to require constantly of master, or mistress, weekly returns of all absentees, with cause of absence, if known, and if not known, stated as not known, that some fit person should make a friendly visit (mind, a *friendly*, and not an *inquisitorial* visit), casually, and without any suggestion of suspicion of fever, and report the information received to whoever acts as Sanitary Aid Manager. If fever be found, tell the Medical Officer of Health, if he be in ignorance of it, and straightway put in hand the furtherance of his endeavours thus. Explain to the mother, or other person in charge, that for her strict performance of the processes of disinfection taught to her she will receive assistance, which you will allot according to the circumstances of the family. Milk allowance; Beef-tea; Wine, or what not, ordered by the medical attendant; or help in paying rent; or for a nurse to sit up at night; or for a person to do the washing, which after disinfection can be done by anyone; or, and please bear this in mind, where no want exists, something friendly and complimentary in the way of small delicacies or little comforts, for something you must give, and keep on giving, all the while you have to press upon her the very tiresome and troublesome labour of the perpetual processes of disinfection. And be sure always to connect your assistance with her obedience to the Inspector's orders. Throughout the illness you hold out the promise of some help towards fresh clothing at the end, and often where there is a very poor mother, and only imperfect isolation of the patient, it is highly desirable to promise both to mother and child a special little present in money, if no one whomsoever be infected from the case. I beg you to observe that a source of immense difficulty to the Medical Officers of Health is the desire of the poor to conceal their cases, they think to tell would be to ruin their occupation, and drive every one away from them; but every family that comes to the experience of your dealing, and finds out what help and relief you give, will advise neighbours in similar case to apply to you, and you may by degrees bring it about that the Medical Officer of Health himself is the poor man's accepted friend. Besides the relief above mentioned, a good supply of loan bed clothing, and infants' necessaries, and some clothes, such as night-shirts, etc., wraps to wear in bed, and sitting up, and plenty of aprons for nurses, should be kept in stock in proportion to the population and poverty of each parish, and provision should be made for isolation of the patient by removal into other quarters of at least the as yet uninfected bread earners of the family; for this you need not have nearly so expensive an establishment as even a Cottage Hospital, but simply a few rooms, cleanly kept in some trustworthy woman's hands.

I have not touched, as yet, upon one of the worst difficulties of the Medical Officer of Health—his lack of a woman teacher to instruct the women. It is impossible for me in this address to explain our system of disinfection in detail, not only because it takes three-quarters of an hour to do so, but that scarcely to a mixed audience could I do it so as to give you a complete grasp of it at all. To an audience like this, however, I may convey a notion of what it is, and, at the same time, of the impossibility of the poor (who can only understand the plainest English, and to whom every point must be particularised) learning it to any purpose from one not of their own sex. We have to teach them that in all the eruptive fevers it is necessary to assume (in the absence of proof to the contrary) that every emanation whatever from the body of a fever patient is capable of giving the fever to other persons, and that every discharge, ordinary or extraordinary, must, so far as is possible, be received from the person into strong cold disinfectants. We have to teach that only those cases which are unattended by any description of involuntary discharge are clean cases; that all others are foul cases, and need an immensely greater amount of precaution in the management than those all offcast from which can, as it were, be disinfected by anticipation. And we have to teach that over and above the instructions usually issued by medical men, there are about three points of vital consequence to the completeness of the success of our work. They are these:—

1st. That not on the completion of desquamation only dare we rely for the safety of the liberation of the scarlet fever convalescent from all rules of quarantine. There is an internal organ which sheds infection until so near the end of the eighth week that we dare return no child to school until the completion of that period, and lest anyone else should sanction earlier return we withhold our new clothing until that time.

2nd. If a subject be scrofulous, or otherwise constitutionally diseased, it takes three months, instead of two months, to clear off infection, so slowly does such a subject eliminate impurity from the blood.

3rd. Every infectious corpse should be smothered, not merely sprinkled, with carbolic powder.*

We are well known in our own borough, and considered as useful and desirable public servants? Our population is about 35,000; what a number of friends and supporters we must have, if, as I have asserted, we have worked with a success which, where our system has been applied, has never incurred a failure all these years! Yet if any one went down to Hastings or St. Leonards to-morrow without a list of our allies, and enquired at random about us, you would have difficulty in discovering our existence. What is the reason of this? Simply, as the lamented Dr. Druitt said to me when, as President of the London Association of Medical Officers of Health, he was advising us upon the constitution of our Society, 'remember that the more successful you are, the harder you will find it to get acknowledgment or support for your work, for prevention makes no show'. And thus it is. Happily all the parochial clergy joined us, and are on our Committee, and to a great extent their district visitors, and school masters, and mistresses, give us that prompt information of first cases which is their part in the covenant between us, and when, as constantly happens, the first case is the last case, even in the very house, and in the very family in which it occurs; no one is excited or agitated about it, hardly anyone troubles to enquire how it happened; it is generally imagined that the fever stopped of itself, and our good informant, who, if she were of an inductive mind, might perhaps reflect that fever does not usually stop of itself, and that if this system, which she is aware wherever administered always stops it, were applied everywhere it would make an end of epidemics, and was therefore worth mentioning extensively. But (in a large proportion of instances) she is not of an inductive mind; the case has given her no trouble, for the Society looked after relief as well as disinfection during the whole two months of its superintendence, and she never thinks of telling anybody. In fact it is popularly believed in the borough that its immunity from any general epidemic during all these years is owing to the climate, or to occult causes. But if this were so how comes it to pass that when—as notably occurred two years ago—a certain school withheld from us the knowledge of its early cases (albeit the Sanitary Authorities knew of them), twenty families had scarlet fever in that one school, and the increase ceased not until we got hold of them all, and six families belonging to a neighbouring school, part of the children in these families belonging to the first indicated school? While in all the other day schools of the town, though hardly one had no case, the record stood thus:— ——— School, 1; ——— School, 2; ——— School, 1; ——— School, 3; and so on; in no instance any spread having occurred from the first cases, though of course not always only a single subject was infected at the same time.

I most earnestly hope that you all, who have given me your kind and patient attention to-day, are resolved at least to investigate my statement, and, if you find it worthy of credit, to stir up others by every possible means to give attention to it. Our mode of doing the work is not the best. The parochial clergy of our borough have got into the habit of preferring that our visitor shall do this work in all their parishes, but if their district visitors would only learn they might, not only as well, but better do it themselves, drawing on their own alms fund for the indispensable conditional relief, and saving all the cumbersomeness of a general association. But of course this implies a disposition to learn, which is the very last thing to be found. Perhaps a person of the character of mission woman could be employed in most parishes, and this might be preferable to the action of every young district visitor in her own place, but it is unnecessary that anyone should expose herself to infection. Before the engagement of the salaried assistant, who now attends all cases and has had all sorts of fevers, the manager was the only available person, and she, having many children, and having had no fevers, did not run into infection, but taught on the doofstep of each dwelling.*

Let me say one word upon the grievous indisposition on the part of women generally to acquaint themselves, while the enemy is outside instead of inside their door, with our most simple system of disinfection. Surely, if it can be learnt, it would be common-sense to learn it as part of education, and to learn it thoroughly. It is this, indeed, which we want, not more law upon the subject (except as relates to the construction of dwellings, and the prevention of the defilement of drinking-water), but education, the thorough grounding of both women and men in the comprehension of what infection is, how it is shed and received, and how to destroy its power. With this knowledge, and with those principles which would prompt its faithful practice, it is not too much to say that we should verify in one important particular that it is in the breach, and not in the fulfilment of the laws which this world's Creator framed, that the children of men bring upon themselves, and on their race, the diseases and death which He has provided for to be avoided. I commend this consideration to you in every possible diversity of application. Upon the amenability of the poor (which you may well think ought not to be merely taken for granted), I have to say that in a very large majority of cases we find no difficulty worth mentioning. In anticipation we thought we should meet with a heavy percentage of intractables; we thought we should be defeated by stupidity here, and by obstinacy there, to an extent which would very sensibly damage our work, but, practically, we have found that adhering to and avowing the principle that we have no more right to invade and interfere with them than they with us, by always evincing sympathy, by coaxing and assisting, and wholly avoiding threatening, or any other mention of pains and penalties enforceable by the Medical Officer of Health than that of allusion, by using our best ingenuity in making such arrangements as prevent suspension of business, or in making up the loss of earnings when inevitably forfeited, and by keeping silence upon every case that is doing well while it is in hand, we find that our unmanageable subjects amount to one per annum of all with whom we have to do, and when we find such an one we take

* As to the use of disinfectants at boiling heat, which is advocated by some, and is excellent if it could be practised, I must remark that in one most important respect it is simply impossible, namely, for the reception of excreta no vessel could be prepared for a patient charged with a boiling fluid. Our nine years' experience has proved that *cold* disinfectants answer perfectly well, and this being the case we find it best to propose nothing that gives more trouble.

* In neighbourhoods where there are houses of ill-fame, the health of those is of most serious consequence. Fortunately the keepers of such are very anxious for the preservation of themselves from the imputation of having been the means of spreading fever of any kind, but the control of any convalescent unfortunate is difficult, and it is well that the police, as well as the Medical Officer of Health, should be told of such cases, and it is necessary to give gratuities in some acceptable form all the while you have to keep hold of them. Be this intercourse, if possible, turned to account for the rescue of poor creatures from perdition of body and soul. In places where there are factories, their owners and managers should be sought out and induced to connect themselves with you.

care in conversing with her to give her full disinfecting information, upon which we have generally found that she acts, thereby gratifying her pride by displaying how well she could do without us! In such a case as this we always inform the Medical Officer of Health of the rejection of our visits.

I am hoping shortly to deliver in Hastings two instructions on our system of disinfection, with examination papers to follow for those who may wish to compete for certain prizes. If any of my London audience should wish to take part in this, they may do so by paying the fee of 2s. into the hands of the Secretary of the National Health Association. It will include the price of a copy of the Manual written by me, which contains all that I know on the subject.* You will find that, if you choose, you may in any parish exclude measles and chicken-pox from any prevalence in your schools, as scarlet fever and small-pox, etc., if you like to attend for three weeks to first cases, to the same effect as for scarlet fever. Also you will find instructions for the extinction of ringworm, and other contagious skin affections.

I should notice that although there is little risk of your finding coldness, or anything less than cordiality, on the part of your Medical Officer of Health, it is not quite so certain that his Inspector will not misconceive of you as a rival, instead of an auxiliary to his own work. Personal explanation at the first outset is very desirable, with the consent of the Medical Officer of Health. If at any time you assist the nursing of a patient, be sure to do this subordinately to the doctor attending the case; and it is desirable to make your relief serviceable to the carrying out of his directions, as indicated when I spoke of relief.

One word upon fatalists impossible of persuasion to the use of means, 'because Ma'am, if it please God the child will take the fever, and if it please Him the child will not', which sounds so pious that you hesitate to answer her! But stop a bit. Shall we leave the child unfed, unclothed, unwashed, and say we are leaving it to Providence! Does it please God that we should neglect all the provision and care on which the child's sustenance and welfare depend? No, nor does it please Him that we should neglect the use of means which He has created and permitted to be discovered for the saving of children, and of us all, from disease and death—this is most displeasing to him! No, dear God-fearing mother, be not deceived; use your best care for your child in all things, including the disinfecting processes now explained to you, and thus you will please God, and may trustfully look up to Him for His blessing on your efforts, and say 'thank God for His goodness in providing for us these things; with His help I will use them to the best of my power, and so, please God, the child will do well'.

* Lessons on the Prevention of the Spread of Fevers. By the Manager of the Sanitary Aid Association for the Borough of Hastings. Dedicated, by permission, to Charles Ashenden, Esq., M.R.C.S., Medical Officer of Health for the Borough of Hastings. Published by James Dorman, St. Leonards-on-Sea. Price One Shilling.

THE DWELLINGS OF THE POOR.—The Committee of the Charity Organisation Society has, we are glad to see, on the motion of the Rev. S. A. Barnett, seconded by Sir Ughtred Shuttleworth, re-appointed the Committee on the Improvement of the Dwellings of the Poor, as affected by the Artizans' and Labourers' Dwellings Act. The Committee comprises many ladies and gentlemen of influence and of practical experience in this most important question.

HEALTH ECONOMY.*

BY FRANCIS VACHER,
Medical Officer of Health, Birkenhead.

ECONOMY is such a many-sided word, and used in relation to so many subjects, that it is in danger of losing some of its significance. Literally it means house rule—*οἶκος νόμος*—the management of domestic affairs. As Nature's provisions for generation, nutrition, and preservation represent her domestic management, we speak of them as the economy of nature. Again, as judicious management knows no waste, and must lead to thriving, economy has become a synonym for frugality and thrift. Now, by health economy I mean the management of health, being careful and saving of it, protecting it from known sources of danger, providing for its generation, nutrition, and preservation. That health economy, thus interpreted, is worthy the attention of the most earnest and thoughtful, you will all be ready to admit. Personally, indeed, it is a topic which we can none of us afford to ignore. Still I do not think that it is in any wide sense deliberately made a subject of study, even by health officers. So much of our time and energy is spent in struggling with disease, tracing out the channel through which it came, obtaining accommodation for the subjects of it, or arranging for the cleansing of infected houses and clothes; and besides all this there is the routine of letter-writing and reporting. No wonder if few find leisure to apply themselves to the economy of health as a serious pursuit.

According to an old proverb, a farthing saved is as good as a farthing gained. Now, health which is saved is not merely as good as health gained or regained, but a great deal better—health being like a good character, invaluable as long as preserved, but often a very inferior article when lost and recovered. It is then surely the first function of every health officer to consider well how health may be saved, *i.e.*, what provisions are necessary for its *generation*, *nutrition*, and *protection*. I purpose to remark briefly on health economy under these three heads.

Generation.—Without going the length of asserting that an absolutely healthy child can only be born of a healthy father and mother, it is at least of main importance that parents should come up to a certain minimum standard of soundness. Not only do all original or connate bodily peculiarities tend to become hereditary, but many diseases, especially those popularly supposed to arise from morbid conditions of the blood, are directly transmissible to offspring. To be more explicit—heredity manifests itself by the transmission of (1) faults of excess or deficiency, (2) new morbid products, and (3) debased normal constituents. Fortunately, in opposition to this tendency for disease and defects to be transmitted, is the tendency to return to the original healthy normal type, limiting the number and extent of deviations from it. Again, as restraining the undue production of unhealthy offspring, it is a familiar fact that the woman who is the subject of disease (especially enthetic or diathetic disease) is preternaturally liable to miscarry. Still the children who enter upon life hobbled at the start by inherited defect or disease, form a very appreciable proportion of the gross number born, and this is not creditable to our humanity or civilisation. Of the inherited defects first manifest, those most frequently met with, hare-lip, cleft palate, strabismus, etc., are happily amenable to treatment,

* Read before the North-Western and Northern Counties and Yorkshire Associations of Medical Officers of Health, May 7th, 1880.

but hereditary amaurosis, deaf-mutism, and a yet more sad affliction, are hopelessly incurable. Of the diseases due to implanted morbid products which are ordinarily transmitted from parents to offspring, the most prolific is undoubtedly syphilis, while of the diseases ascribed to debased normal constituents of the body, the most liable to reappear in the children of the affected belong to the order termed 'tubercular'. I need not point out that the gouty, calculous, cancerous, or hæmorrhagic diathesis is often a family heirloom; or the tendency to transmission of such affections as rheumatism, asthma, epilepsy, apoplexy, etc. Comparatively trifling ailments, are, however, scarcely less strikingly hereditary—obesity, for instance, enlarged tonsils, vertigo, and some simple forms of skin-disease.

It is obvious, then, that the standard of health or soundness desiderated for parents, is in many cases not even approached. For this we must blame the liberty to become parents enjoyed by all not actually idiotic or insane. What then! Must we curtail this liberty in a free country? Certainly. Remember that, as Charles Kingsley says, there are two freedoms—the false, when a man is free to do what he likes; the true, when a man is free to do what he ought. Where, then, should the line be drawn? Not high at first assuredly. But I do think it would inflict no unwarrantable hardship on anyone if permission to marry were denied to those known to be suffering from syphilis, scrofula, or phthisis. Some of you may say, granting the reasonableness of the proposed restriction, public feeling is not advanced enough to give effect to it. On the contrary, I believe that the public are much interested in the subject, and prepared for any manly straightforward proposal with the object of improving the race, and limiting the output of feeble and sickly. In a recent picture in *Punch*, by Du Maurier, a noble lord is represented admiring his well-bred bull. 'You certainly are a fine animal,' he says. 'So would you be, my lord,' replies the bull, 'if your ancestors had been as carefully chosen as mine.' In a still more recent issue of *Punch*, the same artist represents the son and heir of an aristocratic house censuring his parents for their joint interference in his affairs before he was born. Yet again an athlete is depicted making love to a 'fair wrangler from Girton', and this is marked 'all as it should be', while a reference to the ultimate result of the courtship is appended. Straws serve to show the direction of the wind, and prints like these in a popular serial show that popular feeling is ripe for some control being placed on marriage in the interest of the offspring. If the marriages of all clearly suffering from syphilis, scrofula, or phthisis were pronounced illegal by statute, there would then be a very good beginning to legislation in a much needed direction. I say a beginning, because all legislation is necessarily progressive, and when the country got accustomed to liberty to marry being denied to the subjects of certain constitutional diseases, the application of the same rule to the subjects of other constitutional diseases—gout, cancer, etc.—would be demanded, and I need hardly add conceded.

This, then, is the necessary beginning of all reform having health economy for its end and aim—securing that parents shall come up to a fair standard of health. Whether such control as I propose would be approved of by the present Parliament I am not prepared to say, but that a measure in the direction indicated must be carried sooner or later I have no manner of doubt. We may thus look forward with confidence to a future (I believe not a distant future) when ghastly babies, packed with tubercle or corroded with rupia, will be as extinct as the dodo; when the old tainted stock will have yielded place to a generation sound at least up to the time of birth.

I come now to the second branch of my subject—*Nutrition*, and its bearing on health economy. Nutrition may be broadly defined as the function by which living bodies assimilate, or convert to their use, food, water, and air. There can be no doubt that the best food for a healthy child during the first nine or ten months at least, is the food nature provides; and in order that as far as possible every child may get this, it will be necessary to inhibit women from obtaining employment away from their homes for nine or ten months after confinement. As long as nursing-mothers take their place at factories, mills, and shops, or in the fields, or as charwomen, either the work or the nursing will be ill-done, and too often the latter. Many a healthy infant has been injured irremediably through its mother leaving it to earn half-a-crown a day, and I cannot help thinking that the *crèche* is not altogether blameless in suggesting the practice to some mothers, and making it possible to others. I say this with deference, knowing what good work *crèches* have done, and are doing; but a nursing-mother who has a husband to provide for her, ought not to seek the services of such institutions. With a widow or unfortunate mother who may have to support herself and child, the case is different. Yet it would be better for a mother so circumstanced to find work which could be done at her lodgings. And if the mother cannot nurse, what is the best substitute to the child for its normal food? Cow's milk, diluted down to the consistence of human milk, and milk sugar added. When anything like fairly good fresh milk can be obtained, I should certainly prefer it to condensed milk. But it is, after all, one of the rarest things for a healthy mother not to be able to nurse, if she really wants to. When the milk appears to be a little deficient in quantity or quality, feed the mother well, and it will certainly improve. Do not suffer her to attempt to increase the flow by beer drinking. Milk will be more readily formed from milk than anything else. As regards young children, that is, from weaning up to about seven, they seem to progress better almost without solid animal food. The diet of all children and young persons, that is, till manhood is attained, should be abundant, and carefully varied. I can lay down no rule as to diet for adults, except that it should be moderate and *varied*. Perhaps the importance of varying diet is not sufficiently insisted on. When we experience the renovating effects of a holiday, we are too apt to put it down to change of air, and scene, and occupation, forgetting that the mere change of diet contributes largely to the good results obtained. It may be owing to this that a week or two abroad does us so much more good than—what shall I say?—going to Southport with the children. Alcohol, I am happy to say, does not now form a part of the ordinary diet of young persons, and many adults will find they are healthier without it. I have only one more observation to make with reference to food, that is, that all, young or old, who study health economy, must eschew three things—meat lunches, afternoon teas, and suppers.

In the function of nutrition water performs an important part. This must be evident when we consider that rather more than two-thirds of the body is water. Estimating the total of food consumed by a healthy adult in twenty-four hours at 6¼ lbs., about four-fifths

would be water—say 86 oz. Of course the greater part of this would be taken as a constituent part of so-called solid food, but about 30 oz. would be as beverage. Now, obviously, the best way of taking this is in three half-pints, distributed among three meals, and supposing it is prepared as coffee at breakfast, toast and water, or even beer, at dinner, and as tea for the evening meal, it will be quite possible to get through the day without recourse to raw water at all. Surely this is the safest practice, indeed the only safe practice. Neither river water, nor surface well water, is ordinarily safe. The water from deep wells, inasmuch as it is always liable to be fouled by soakage from the upper strata, through imperfections of the well casing, is rarely safe. Rain-water, however carefully collected, containing two grains per gallon of air cleansings, is neither palatable nor safe. Even spring water, usually bright and pleasant, is not always quite innocuous, and how few can obtain it. If people are in earnest about conserving their health they should avoid raw water—unboiled water. I need not say that water is just as raw after being mixed with brandy as before. In several districts cottagers have been advised to extemporise filters out of flower pots. This I certainly should not recommend. Indeed, my experience is that water is far more often fouled after delivery, than delivered foul. Fairly good water supplied to a house is fouled in cisterns buried under the ground for coolness, or hidden under the roof to be out of the way; it is fouled through overflow pipes, through closet service pipes; it is fouled by being left standing in dirty vessels, and uncovered vessels, and perhaps most of all in the process of domestic filtration. My advice to cottagers is to draw their drinking-water from the main, if possible, and, if not from a clean cistern, to keep the cistern covered, and to boil the water, whatever its source.

Pure air, as regards most people, is more attainable than pure water—that is, air coming up to a minimum standard of purity is within the reach of most people, if they will only take the trouble to admit it. The air supply should be sufficient in quantity, of medium humidity, tolerably equable temperature, and, obviously, if it is to remain pure, it must be kept moving. A certain amount of training is also required to enable the breather to make the most of the air provided. In the interest of growing chests, stools and forms should be replaced by backed seats. Children should be taught to practise taking full charges of air into the lungs, for a short time daily. Then swimming and rowing, as the best exercise for expanding the chest, should be systematically taught young people of both sexes. There are other suggestions which have been made from time to time, and which will occur to many of you, for strengthening and developing the respiratory apparatus. Though the proportion of the population not provided with fairly pure air is insignificant when compared with the proportion not provided with fairly pure water, there are many urban districts where the air cannot, even in courtesy, be called pure. When the Alkali Acts are amended, and power is given to Local Authorities to take action for the abatement of noxious vapours, as in respect of other nuisances, and groups of works are made collectively liable for nuisance and damage, no doubt relief will be afforded to the dwellers in these districts. The provisions medical men and sanitary officers have agreed to recommend are pretty well known, and I need not repeat them here. Perhaps it will be more profitable to remark on what the aggrieved worker can himself do to cleanse the air he complains of. He cannot make it quite pure, but he can improve it appreciably if he will be advised. First he can filter off all floating particles of dust, carbon, etc., by means of little flannel screens fixed in the upper part of his window frame, or in such openings as he uses for obtaining his air supply. Now these mechanical strainers may also be used for depriving the air of noxious vapours. The gases and vapours it is sought to separate from the air are carbonic acid, sulphurous and sulphuric acids, chlorine, hydrochloric acid, nitric acid, sulphuretted hydrogen, and ammonia. I do not mean that all these are present in the same locality, but two or more gases or vapours are present in one district, two or more in another, and by arranging that the little screens are kept charged automatically by syphon bottles with certain chemical solutions, the offending gases or vapours may be eliminated. If the object sought be to engage the carbonic acid, a strong solution of soda or potash might be used. If it be desired to decompose sulphurous acid, weak Condy's fluid might be used. So, also, free chlorine might be separated by dilute ammonia. Supposing, owing to any exceptional circumstances, the impurities happened to be very gross, and it became necessary to use a strong acid or strong caustic solution, specially prepared gauzes (say of india-rubber sponge) would then have to take the place of the flannel. What I propose is nothing like as difficult as the feat accomplished by Fleuss, the diver, who breathes the same air over and over again, purifying the exhaled breath by means of alkali, and revivifying it with oxygen.

Protection.—The main desideratum, a healthy stock, having in course of time been attained, and the parents and children, free from constitutional taint, drawing sustenance from wholesome food, pure water, and fresh air, it remains for me to consider what provisions for protection would be needed. After the extinction of hereditary diseases, and diseases due to filth and overcrowding, and foul air or water, there would still be maladies it would be necessary to guard against; there would still be the two fruitful disease causes to contend against—excess in eating and drinking, and what is ordinarily called 'vice'. Of course we can imagine a people in any hypothetical condition of health, and some of you may say it is scarcely more Utopian to conceive the stamping out of all disease, than the stamping out of hereditary disease. I cannot, however, agree to this. Marriage has been subjected to such limitations as I propose by great States in times past, and hereditary syphilis and struma have been repressed. To me it seems far less visionary to speak of getting rid of scrofula, than getting rid of measles, and scarlatina, and whooping-cough; yet these are ordinarily referred to as preventable diseases. After uprooting the graver forms of hereditary disease and filth diseases, supposing all this possible, the nation would still have to provide for the protection of children against neglect, of the intemperate against themselves, of the innocent against the baneful effects of promiscuous intercourse, of the ignorant against the tricks of nostrum mongers, and of all against the encroachments of exanthematous diseases. What means, having for their object the economy of health, appear to be most urgently demanded? I will name some.

1. For the efficient protection of infant life nothing less than the entire prohibition of infant life insurance will suffice. The premium insured for is an incentive to neglect, a premium on neglect in fact. Too often it is well earned. It is expended, not in giving the deceased decent burial, but in frantic nocturnal orgies. What is won over the devil's back is spent under his belly.

2. As regards the Infant Life Protection Act, unless amended so as to provide for the registration and inspection of every house where a nurse-child is received by other than relatives, it may as well be repealed. Some are inclined to think that the only wise course with reference to baby-farms is their entire suppression, which, while it would stop the horrible trade in flesh and blood, need not interfere with the right of any family to take in a nurse-child, and receive payment in respect of it. In this case the family should be required to report the acceptance of such a trust to the local health officer, who would keep a list of the children thus lodged, and inspect and report, and if necessary institute proceedings.

3. Adult men or women who are of known intemperate habits, and unable to exercise proper control over themselves, on this being sworn to before a magistrate by two or more witnesses, and certified by a medical man, should be committed to proper hospitals for treatment and restraint, just as juvenile offenders are committed to Industrial Schools. Merely giving habitual drunkards power to sign away their own liberty for a few months is not likely to be of much benefit to themselves or others. A patient's health may be saved by removing him out of harm's way in time, and it is a terrible waste of health and life to leave him to himself.

4. The Contagious Diseases Acts are, I fear, somewhat delicate ground. Still I cannot but say that their extension is demanded in the interest of the suffering and the innocent. The depths of disease into which a certain residuum of outcasts fall is scarcely understood, except in seaport towns. I can only speak of it as an infinite profundity. I know of nothing to compare it with, or liken it to. Yet these women have children, not very often perhaps, but they have them. And the poor things love their babies too, after their way, or they would not bring them to the Dispensary, and show them to you and say, pitifully enough, 'Doctor, what can you do for this?'

5. For the protection of the public against patent medicine makers and vendors it seems necessary to prohibit the sale of all drugs under any than their ordinary names, and all compounds and mixtures, prepared as patent foods or remedies, the contents of which are not expressly stated. It is the secrecy and mystery about these preparations that makes them so sought after. If the anxious mother knew that Steedman's powders were compounded of calomel and sugar she would not place much faith in them, but the powders being represented to her as a secret remedy she possibly jumps to the conclusion they are made of herbs gathered in the new moon, and cooked in a witch's kettle.

6. Isolation of the initial subjects in outbreaks of epidemic disease, and the necessity of providing accommodation for them, and for all infectious sick, and infectious convalescents, are matters which I need only mention as still requiring attention. Happily most sanitary authorities are fully impressed with the importance of the segregation of infected patients.

7. The law making vaccination compulsory, the one really great achievement of protective legislation hitherto, is still susceptible of improvement. The amendments that occur to me would require :—(*a*) The performance of the operation earlier than at present. Parents could as easily be induced to bring their infants at six weeks old as at twelve weeks. This would diminish by one-half the virgin material available for the spread of small-pox on the occasion of an outbreak. (*b*) The re-vaccination of all at or about puberty. Re-vaccination is always proffered during an epidemic, and ordered previous to entrance into the public service. The large proportion of cases in which it succeeds witnesses to its usefulness. (*c*) Some arrangement for accommodating with heifer lymph all who prefer it. (*d*) The vaccination of all unvaccinated immigrants at the port of debarkation, the absence of good marks being held as proof that an immigrant is unvaccinated.

This list of suggestions for preventive measures, or amendments to preventive measures, might be almost indefinitely prolonged. Thus, something might be done for facilitating the reclamation of tracts of waste marsh land and tidal river fore-shores, for helping forward comprehensive drainage works in uncombined rural districts, for authorising sanitary authorities to plant trees on low-lying insalubrious sites, the drainage of which may present exceptional difficulties, etc., etc. Indeed, the subject I have taken up, health economy, is so wide reaching, all I have been able to do is to urge its claims on our attention, and to point out the direction in which an honest regard for it will lead us. I cannot expect every one of my propositions will pass without criticism—the one conclusion I am quite certain all present will assent to is that the marriage of those who are obviously suffering from syphilis, scrofula, or phthisis is a sin against God and man, and should be prohibited.

A RAPIDLY FATAL CASE OF SO-CALLED TYPHUS FEVER.*

By Dr. Britton,

Medical Officer of Health, Halifax Combined District.

L. J., aged 22 years, a domestic servant, was standing at the corner of a field in a country place, watching the cabs passing along the road on the day of the county election, on August 7th, 1879. In this corner were deposited from ten to twenty loads of fresh night-soil, just removed from a number of tubs used by the occupants of several rows of cottages. There were no cases of fever in any of these cottages. The smell from the collection of night-soil was very offensive, and much complained of by the passers-by.

On August 8th she did her household work as usual, and did not complain until tea-time, when she informed her mistress that she felt very tired, and that her head ached. She went to bed, and on her mistress visiting her in a couple of hours she seemed much worse. She was seen by the family medical attendant at 8 P.M., who reports as follows—Great prostration and lassitude, violent headache, dry brown tongue, great thirst, skin hot and dry, features wearing a look of great anxiety and distress, great restlessness, pulse 130, temperature 104·6, language incoherent, bowels constipated. August 9th, 9 A.M.—Temperature 104·2, all the symptoms aggravated; black sordes on lips and tongue. 2.30 P.M.—Patient very restless, and constantly attempting to leave the bed and throw off the clothes. Temperature 104. 9 P.M.—Temperature 104·2; bowels not moved yet. Removed to hospital.

August 10th, 5 P.M.—I saw her at the fever hospital and found her comatose. She had had a motion and also passed some water, both involuntarily. Temperature 103·4, pulse 140, eyes much injected.

On August 11th, at 7 A.M., she died.

* Read at the Combined Meeting of Medical Officers of Health at Leeds, May 7th, 1880.

She was a delicate girl, and had suffered a great deal from rheumatic pains. The sanitary condition of the house and surroundings was good, and the water supply pure.

This case was diagnosed as typhus fever by the medical attendant and by the hospital matron and nurses, in which diagnosis I concurred; but when the subject was discussed, the feeling of the meeting was that it was not a case of typhus fever, but of blood poisoning.

THE

SANITARY RECORD.

JUNE 15, 1880.

The Editor will be glad to receive, with a view to publication, announcements of meetings, reports of proceedings, and abstracts or originals of papers read before the members of any sanitary or kindred association.

SANITARY INSPECTION AND CLASSIFICATION OF DWELLINGS.

In a very practical speech by Mr. Cresswell, Q.C., the visitors to the Society of Arts on June 11 (*see* p. 469) were shown that it might perhaps be possible to classify dwellings after some such fashion as ships are classed on *Lloyd's Register*. His hearers could not for a moment doubt the truth of the many allegations brought against the houses of the present day and their constructors, and would hail with delight any feasible scheme by which the errors of omission and commission found in them could be satisfactorily eliminated. It was evident enough, however, to many of the speakers present, that a proper working out of the idea was fraught with difficulties of various kinds, and that before such a scheme could be considered workable, it must be subjected to a severe ordeal, and its applicability to all kinds of residences proved beyond any matter of doubt. Otherwise the proposed reform will only after a short trial find itself consigned to that place where many well meaning but abortive attempts at improvement have already gone. The idea is not a novel one, and has, indeed, been mooted by various persons on several occasions, and it remains to be seen whether the energy of the present promoters and their coadjutors will succeed in launching the project to the satisfaction of all concerned.

Of course, such a system of regulating the hygienic condition of dwellings, even if it were demonstrated to be thoroughly practicable, could not for a very long time be made compulsory upon residents in town and country, and this was fully acknowledged by its projector. It is doubtful, indeed, whether such a drastic method of dealing with the question would ever become law, or be anything but permissive in its character, however much we might wish to see it enacted in its entirety. For the present the *pros* and *cons* of the question need careful study at the hands of all the professions and trades that unite in constructing our houses and hotels, and the arguments adduced should be properly weighed and balanced by exact minds.

The greatest difficulty, as was pointed out by one speaker, will doubtless lie in the absolute impossibility of giving a house which has been already built a first-class certificate. No wise engineer would venture to recommend a perfect bill of health without having dug up the whole of the basement, to a certain depth, with a view of ascertaining the condition of the drains and the absence of old cesspools, which latter are so commonly met with inside houses which have been built previous to the last fifty years. And, inasmuch as dampness produces its quota of evils, the insertion of proper damp courses must have been made sure of. The positions of the closets also demand attention, for many of these simply ventilate themselves into the houses, and, besides this evil factor, there are bad patterned water-closets and indoor soil pipes of lead and iron for which to find a cure. Due attention must also be paid to ventilation, as no house can be called perfectly healthy where is an absence of regular air-currents. In country houses, also, a very serious question always arises regarding the purity of the water-supply; and, if the ground around the house be thoroughly saturated with sewage matter, it is difficult to imagine how such a house could ever be deemed satisfactory.

It would be comparatively easy to deal with a new house, for then the underground conduits will be found to consist of stoneware pipes, the soundness and proper inclination of which can be tested after some little trouble. But not one in a thousand of even modern-built houses can be considered as having been properly dealt with in the matter of waste pipe entries and cistern overflows, and even in houses which are being run up at the present day, in the western suburbs of London especially, it is usual to find the commonest rain-water pipes, with open joints, made to do wholesale duty as the carriers of closet soil, bath wastes, and rain-water from the roofs; and not only this, but communicating directly with the drain at the bottom, thus ventilating at the rain-water head and lead-flap entries, the whole of the drainage system into the bedroom windows. Even the proper examination of a newly-built residence—we mean those which have paid no qualified architect's commission—is a work of considerable care, whilst, as regards the cost of a proper re-equipment of the services in houses improperly treated, it may be safely assumed that this will cost, under the most favourable circumstances, the entire amount of a year's rental.

There will be many difficulties to overcome beyond the apathy of householders, and chief among those will be found the difficulty of getting together a proper staff of qualified engineers who are inspectors, and inspectors who are engineers, well-versed in the tricks of the various trades, and in the metaphysics of jerry-building. Still, these can be

found when the demand is once put in shape, and it is to be hoped that they will all prove equal to the occasion in point of perseverance, and be always, like Cæsar's wife, above suspicion. It will be doubtless difficult to make the scheme self-supporting, even with contributions from the rates, and it is to be hoped that the initiators of the proposed reform have not undervalued the cost of making due inquiries as to the initial health-worthiness of the houses, and of the machinery which must be employed to carry their ideas into effect. If there be anything of value in the proposed scheme, we hope it will be made apparent before long to the satisfaction of all parties.

NOTES OF THE MONTH.

MEASLES AT NOTTINGHAM.

Measles has been extremely prevalent at Nottingham for some time, and during the last few weeks has assumed a very serious aspect. The Health Committee have therefore issued a circular to the inhabitants, in which they point out that since the beginning of the year there have been no fewer than 108 deaths, and during the week ending June 5th, as many as 23 fatal cases. They justly observe that this high mortality indicates not only a general prevalence of the disease, but also an excessive fatality among the cases, and wish to call attention to the fact that of the 108 deaths which have taken place during January and February, 76 have been due to either inflammation of the lungs or bronchitis coming on in the course of the illness. Simple and uncomplicated, measles is, comparatively speaking, rarely fatal, but it is well known that the lungs are specially liable to become affected in this disease if there be exposure to cold. The Committee therefore come to the conclusion that the sick children have not received a reasonable amount of attention, and circulate a very practical and sensible bill of precautions to be observed when measles occur in a household, drawn up by Dr. Seaton, the able Medical Officer of Health for Nottingham. In the last paragraph of this circular attention is specially drawn to the necessity of protecting children suffering from measles to the risk of catching cold.

MOURNERS' CLOAKS.

The Jewish community have for sanitary reasons decided on discontinuing the use of mourners' cloaks at funerals. Circumstances came to the knowledge of the Council of the United Synagogue, which led them to think that contagion had been spread by the unavoidably indiscriminate use of these ceremonial appurtenances. They have therefore resolved that they should not be worn in future, and in their report, lately issued, set forth their reasons as follows:—'Public attention has lately been called to some of the probable means by which contagion is diffused. The committee are of opinion that the palls and mourners' cloaks afford such a means for spreading infection. These appurtenances are, of course, used indiscriminately in cases of death from infectious and non-infectious disease, and almost necessarily carry with them from house to house the insidious germs of the most fatal maladies. The mischief which may be propagated by contact with these paraphernalia is incalculable. The committee recommend the council to resolve that they be discontinued at or in connection with the funerals of the United Synagogue. The simplicity with which funerals should be conducted has been generally recognised, both within and without the community. The solemnity of a funeral can receive no augmentation from the use of a pall, nor can the feelings of the mourners be affected in any degree by the employment of a black cloak. The first was introduced to hide from public view the white deal of which coffins for Jewish use are in the majority of instances made; and the latter originated in the desire to cover the garments of poorer mourners, who might feel ashamed to attend the funerals of their relatives, or the synagogue on the Sabbath during the week of mourning, in their usual attire. The committee believe that with the spread of intelligence these reasons have ceased to be operative. Educated public opinion sees nothing disrespectful, but on the contrary something commendable, in the absence of decorative appliances which distinguishes a Jewish funeral; and the sympathy and condolence extended to all who mourn must render the use of a black cloak to conceal the mourner's attire superfluous. There may be some in the congregation who will object to relinquishing a custom which time has consecrated to them, but the committee trust that the council will take this opportunity of teaching and leading the minds of the congregants in such grave circumstances and considerations as are involved in the possible introduction and spread of contagious diseases in their households.' We trust that the example thus set of obedience alike to the precepts of sanitary science and common sense may be followed by the English nation generally.

SANITARY SURVEYORS.

Many complaints continue to reach us in reference to the position of Surveyors under the present mode of working the Public Health Act. The salaries offered in 1872, which at the time were expected to be permanent, induced many able young men to give up safe posts to take situations under it, an additional security being felt in the Local Government Board paying half the amount of the salary, so as to enable Rural Sanitary Boards to secure the services of really competent men. The system, however, of appointing the officers for one year, annually renewed, has enabled boards to divest themselves of all responsibility, and to revise the appointments without notice to the holders, which revision has in nearly, if not quite every case, meant a reduction of the amount paid towards salary. The consequence has, our correspondents assure us, naturally been the resignation of a large number of thoroughly competent men and the substitution of persons of inferior qualifications.

DISEASE IN DURHAM.

The amount of disease at present existing in most of the Durham pit villages is, we are informed, almost unprecedented. Although both scarlet-fever and typhoid are tolerably prevalent, diseases amongst children are the most common, and consist nearly wholly of measles and scarlatina. Of the former, it is a common thing to see three or four members of a family all down at once, but perhaps most deaths have resulted from scarlatina, or, more properly speaking, from the diseases which follow in the wake

of that malady. Our informant is of opinion that defective sanitary arrangements, bad water, and overcrowding of houses—from which few of the Durham pit villages are free—have a great deal to do with the matter, that those evils are more rampant now than they have hitherto been, and that a retrograde step was taken when the office of inspector of nuisances was removed from the hands of the police and transferred to the existing officials. The policeman was resident amongst the villagers, and was personally aware of a great deal that is either concealed from the present inspector, or is, from the extensive nature of his duties, missed entirely at present. The present system of inspection is both more costly and less effective than the old system. One great cause of the spread of disease, for example, may be found in the reckless way in which pit people visit each other when infectious disease may be in their homes. Nobody can check this vicious practice so well as the resident policeman when clothed with the powers of a sanitary officer. Opinions, of course, will differ widely on this subject. Our correspondent, however, is a thoroughly practical man, well versed in the habits and customs of the inhabitants of the northern towns and villages, and we therefore give to his opinions the publicity of our columns.

A HINT TO HOLIDAY-RESORTS.

In his last annual report on the health of the Keswick district, Dr. Ward records action on the part of the Local Authority there, which may serve as a useful example to other places depending for their prosperity upon the presence of visitors during the holiday season. It appears that the Local Board have resolved to grant, after inspection and report by the officials of the Board, certificates to such hotel and lodging-house keepers, as choose to avail themselves of the privilege, with regard to the fulfilment of the requirements of sanitary science in their establishments. Such certificates, as Dr. Ward states, will tend to reassure visitors, who may have suffered from sanitary defects in other places, and will doubtless also excite an useful emulation in hotel and lodging-house keepers.

THE PUBLIC HEALTH
DURING MAY 1880.

THE mean temperature during last month corresponded with the average May temperature during 100 years. An excess of temperature prevailed on 11 of the 30 days of the month, while on 19 days the temperature was below the average. The mean temperature during the month at the Royal Observatory, Greenwich, was 52°.6. The coldest day was Monday the 10th, when the mean was only 43°.8 and 7°.3 below the average; whereas, on Wednesday the 26th, the mean was equal to 68°.3, and showed an excess of 12°.2. Rain was measured on four days only during the month, to the aggregate amount of only half an inch, which was 1.6 inches below the average May rainfall in 61 years. The sun was above the horizon during 482.1 hours of the month, and 192.8 hours of bright sunshine were recorded, exceeding the amount registered in any month since June 1877. The amount of sunshine recorded in each month of the present year has shown a marked excess upon the respective amounts in the corresponding months of last year.

In the twenty large English towns dealt with in the Registrar-General's weekly return, containing an estimated population of about seven and a half millions of persons, or nearly a third of the entire population of England and Wales, 21,323 births and 11,918 deaths were registered during the four weeks ending May 29th. The births were equal to an annual rate of 37.1 per 1,000 of the estimated population in the twenty towns; the birth-rate in London corresponded with the rate in the aggregate population in the nineteen provincial towns. The deaths registered in the four weeks of May were equal to an annual rate of 20.7 per 1,000, against 29.0, 22.3, and 21.9 in the three preceding months. The May death-rates in these twenty towns were equal to 23.8, 21.4, and 22.4 per 1,000 respectively in 1877, 1878, and 1879. Thus, the health of our largest towns during last month, judged by their mortality statistics, compares very favourably with that prevailing in recent corresponding periods.

The lowest annual death-rate in the twenty towns during May was 17.4 in Portsmouth. The rates in the other towns, ranged in order from the lowest, were as follow:—Leeds, 18.0; Leicester, 18.0; Hull, 18.4; Brighton, 18.8; London, 19.3; Oldham, 19.3; Birmingham, 20.0; Bristol, 20.1; Bradford, 20.6; Wolverhampton, 20.8; Newcastle-upon-Tyne, 20.9; Nottingham, 21.4; Norwich, 21.4; Sheffield, 21.9; Sunderland, 22.6; Liverpool, 26.4; Manchester, 26.5; Plymouth, 27.8; and the highest rate during the month was 28.0 in the borough of Salford. In the nineteen large provincial towns, which have an aggregate population somewhat exceeding that of London, the annual death-rate during May averaged 22.0 per 1,000, while the rate in London did not exceed 19.3. The high death-rates recorded in Liverpool, Manchester, Plymouth and Salford, were in great measure due to excess of zymotic fatality.

The 11,918 deaths from all causes in the twenty towns included 1,743 which were referred to the seven principal zymotic diseases; 542 resulted from whooping-cough, 450 from scarlet fever, 336 from measles, 160 from diarrhœa, 155 from fever (principally enteric), 60 from diphtheria, and 40 from small-pox. These 1,743 deaths in the twenty towns were equal to an annual rate of 3.0 per 1,000 during the four weeks under notice, against 3.9, 3.3, 3.1, in the three preceding months. In the nineteen provincial towns, the zymotic rate was 3.2 per 1,000, while, in London, it did not exceed 2.9. The annual death-rate from these diseases during May was but 1.1 and 1.4 in Leeds and Birmingham, whereas it ranged upwards in the other towns to 4.0 in Norwich, 4.3 in Manchester, 5.9 in Sunderland, 6.2 in Salford, and 11.5 in Plymouth. Whooping-cough was again the most fatal zymotic disease during May, causing 299 deaths in London and 243 in the nineteen provincial towns; this disease caused the largest amount of fatality in Liverpool, Manchester, and Salford. The remarkably fatal epidemic of measles in Plymouth resulted in 58 deaths against 73 in April; the greatest fatality of measles in the other towns was recorded in Sunderland, Leicester, and Nottingham. Scarlet fever showed a generally increased fatality during May; it was proportionally most fatal in Salford, Norwich, Sunderland, and Sheffield. The 151 deaths referred to fever in the twenty towns showed an increase of 4 upon the number returned in the four weeks of April; only 61 were returned in London, whereas 94 were recorded in the other nineteen towns. The greatest fatality of fever (almost exclusively enteric) occurred in Salford, Sheffield, Liverpool, and Manchester. The 60 deaths referred

to diphtheria included 38 in London, while but 22 occurred in the nineteen provincial towns. Small-pox caused 38 more deaths in London, one in Birmingham, and one in Sheffield (a doubtful case), while no death from this disease was registered in any of the other nineteen towns. The Metropolitan Asylums Hospitals contained 218 small-pox patients at the end of May, against 163, 172, and 196 at the end of the three preceding months. The weekly number of new cases of small-pox admitted to these hospitals, which had been 50, 39, and 46 in the three preceding months, was 44 during May. Judging by the hospital returns, therefore, the prevalence of small-pox in London last month showed no decline.

The fatality of diseases of the respiratory organs showed a further marked decline during May. The weekly number of deaths referred to these diseases in London, which had averaged 932, 350, and 317 in the three preceding months, did not exceed 254 per week during May. The death-rate from lung diseases showed the usual wide variations in the several towns for which this information is available; it ranged from 2.6 and 3.1 per 1,000 in Portsmouth and Plymouth, to 6.3 in Salford, 6.4 in Liverpool, and 8.8 in Manchester. The high rate in Manchester suggests the doubt whether the Medical Officer of Health for that city includes deaths from phthisis in the column for lung diseases in his weekly statement of mortality statistics.

In the outer ring of suburban districts around London (having a population little less than a million persons) the annual death-rate from all causes during May did not exceed 15.6, and the zymotic rate was 2.1 per 1,000. In inner, or registration London, the corresponding rates were, as before stated, equal to 19.3 and 2.9 per 1,000 respectively.

We are able to publish in the accompanying table uniform mortality statistics for 181 urban sanitary districts. In the corresponding tables for the ten preceding months, the number of contributing sanitary districts steadily increased from 36 to 176. On the last day of May, 200 post-cards were sent out to the Medical Officers of Health of as many urban sanitary districts, including 20 first applications. No less than 181 of these cards have been returned, and the statistical information furnished thereon is herewith published.

We have reason to hope that the number of contributing urban sanitary districts will continue to increase, and we are glad to take this opportunity to thank Medical Officers of Health for the ready and punctual despatch of their cards of statistics. While we are fully aware of the difficulty which frequently stands in the way of furnishing the requested information immediately after the close of the month, we venture to hope that, whenever practicable, the cards may be posted during the first three days of each month, as the table is prepared under considerable pressure, which can only be eased by the early transmission of the cards. We also hope that all Medical Officers of Health will endeavour to obtain from the local registrars and to furnish each month the number of births registered; registrars are bound to furnish this information, together with their return of deaths, without any extra charge, and we need scarcely remind Medical Officers of Health that the information is important for the purpose of calculating the rate of infant mortality.

The estimated population of the 181 sanitary districts, for which we publish May statistics in the accompanying table, is nearly seven and a half millions of persons; and including London and its outer ring of suburban districts, it would amount to about twelve millions. The annual birth-rate in the districts furnishing this information averaged 36.5 per 1000, against 36.5 and 38.5 in the two preceding months. Too much value should not be attached to monthly birth-rates for comparative purposes; it may, however, be noted that during May, the annual birth-rate was exceptionally low, and under 22 per 1000 in Pembroke, Rusholm, Devonport, Lichfield, Abingdon, Harborne, and Bromley (Kent). The continuance of exceptionally low birth-rates suggests an over estimate of population. Among those urban sanitary districts in which unusually high birth-rates (exceeding 55 per 1000) prevailed during last month may be noted Widnes, Fleetwood, Leigh, Harwich, Ilkeston, Burton-on-Trent, and Nuneaton. It appears probable that the present population of some of these last mentioned sanitary districts is under-estimated, the effect of which would be to over-state both the birth-rate and death-rate.

The annual death-rate during April averaged 21.1 per 1,000 of the estimated population in the 181 Urban Sanitary Districts; in the five preceding months the average death-rates in the contributing sanitary districts steadily declined from 25.2 to 21.6. In the twenty large towns, including London, the average death-rate during last month did not exceed 20.7 per 1,000; it follows, therefore, that the rate of mortality in the smaller urban districts must have considerably exceeded that which prevailed in the larger towns. The annual death-rates during May were exceptionally low, and under 15 per 1,000 in Harborne, Ilfracombe, Rusholme, Banbury, Teignmouth, Pembroke, Tiverton, Truro, Worthing, Bromley, Cambridge, Cirencester, Cockermouth, Dorchester, Dover, Eastbourne, and Redditch. Some of these districts are almost too small to yield trustworthy rates for so short a period as a month, but in the cases of Rusholme, Banbury, Bromley (Kent), and Cambridge, these low rates have been maintained in at least two consecutive months, and in Dover and Eastbourne low death-rates have frequently been reported during the past ten months. Exceedingly high death-rates, over 30 per 1,000, occurred during May in Ashton-under-Lyne, Boston, Carnarvon, Dawlish, Hindley, Leek, Lichfield, and Swansea. The high rates in Ashton-under-Lyne, Carnarvon, Hindley, and Swansea, were mainly due to zymotic fatality, and in Boston and Lichfield to excessive mortality from diseases of the respiratory organs. The high rate in Dawlish appears to be due to the fact that 7 of the 11 deaths were of persons aged upwards of 60 years; no death was referred to any of the seven zymotic diseases, or to any of the acute diseases of the respiratory organs.

The annual death-rate from the seven principal zymotic diseases averaged 2.8 per 1,000 in the 181 sanitary districts, against rates declining from 3.1 to 2.7 in the four preceding months; the death-rate from these diseases in the twenty towns averaged 3.0 per 1,000. In 43 of the 181 sanitary districts no death was during May referred to any of these seven zymotic diseases. The zymotic death-rate was however, excessively high, and exceeded 6 per 1,000 in Salford, Ilkeston, Cowpen, Walker-on-Tyne, Bisley, Hyde, Carnarvon, Plymouth, Altrincham, Audenshaw, and Hindley. Small-pox caused but three deaths in these 181 sanitary districts during May; of these, one each occurred in Birmingham, Stroud, and Sheffield. We may note, moreover, that the Medical Officer of Health for Sheffield has reason to doubt

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MAY 1880.

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox.	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
LONDON	**3,664,149**	**10,424**	**5435**	**1245**	**1043**	*	*	*	**1980**	**814**	**88**	**98**	**219**	**38**	**299**	**61**	**61**	**1015**	**546**	**214**	**1007**	**37.1**	**19.3**	**2.9**	**3.6**	
ABINGDON	6,033	11	6	1	1	..	..	1	3	..	..	..	..	..	..	..	..	..	2	..	..	21.5	11.7	0.0	0.0	W. T. G. Woodforde, M.D.
ACCRINGTON	30,000	90	48	18	9	3	3	11	4	2	..	..	1	..	..	..	1	9	5	..	..	35.3	18.8	0.8	3.5	J. Ewart.
ACTON	14,000	54	30	6	3	1	1	10	9	6	..	2	..	..	3	1	..	4	2	..	..	50.3	27.9	5.6	3.7	T. Francis.
ALTRINCHAM	12,000	43	27	7	9	3	..	3	5	12	..	3	6	..	2	..	1	4	..	..	1	42.2	26.5	11.8	3.9	G. H. Atwell.
ASHTON-UNDER-LYNE	33,417	112	90	21	15	5	9	25	15	13	..	3	2	..	5	3	..	13	15	..	11	39.5	31.7	4.6	4.6	W. H. Hughes.
ASTON MANOR	52,821	168	81	28	14	3	4	14	18	9	..	2	2	1	2	..	2	29	6	1	..	37.4	18.1	2.0	6.5	H. May.
AUDENSHAW	6,000	22	16	3	7	3	..	2	1	7	..	..	7	..	..	..	..	1	1	..	..	43.1	31.4	13.7	2.0	R. Slater.
BANBURY	13,500	*	15	2	2	..	2	2	7	1	..	..	..	..	..	1	..	4	2	..	..	*	13.1	0.9	3.5	R. Grimbly.
BANGOR	7,835	*	12	4	2	..	..	5	1	..	..	..	..	..	..	..	..	5	1	..	..	*	18.0	0.0	7.5	H. Rees.
BARNSLEY	30,000	103	60	18	10	*	*	*	19	10	..	..	7	..	1	..	2	6	8	..	6	40.4	23.5	3.9	2.4	M. T. Sadler, M.D.Lond.
BARROW-IN-FURNESS	40,000	152	57	22	15	3	7	8	2	9	..	1	3	..	2	1	2	12	7	3	1	44.7	16.8	2.6	3.5	J. Settle.
BATH†	53,649	92	75	12	11	5	4	19	24	8	..	..	4	1	1	2	..	7	8	1	13	22.4	18.2	1.9	1.7	A. B. Brabazon, M.D.
BATLEY	29,851	98	55	14	15	6	5	8	7	7	..	3	1	..	..	..	3	8	6	1	..	38.7	21.7	2.8	3.2	W. Bayldon.
BECCLES	5,000	19	5	2	1	..	..	..	2	..	..	..	..	..	..	..	..	2	..	1	..	44.7	11.8	0.0	4.7	E. B. Crowfoot, M.B.
BILSTON	25,000	*	46	13	9	4	1	8	1	9	..	..	2	..	1	3	3	*	..	..	..	*	21.7	4.2	*	W. M. Hancox.
BINGLEY	9,000	30	19	2	4	..	1	8	4	3	..	..	..	..	2	1	..	2	4	..	..	39.3	24.9	3.9	2.6	J. W. Craig, M.D.
BIRMINGHAM†	394,738	1223	600	172	97	31	26	158	116	43	1	1	8	4	16	5	8	157	56	25	83	40.4	19.8	1.4	5.2	A. Hill, M.D.
BISLEY	5,240	20	9	1	5	..	..	..	3	4	..	..	..	..	..	..	..	3	1	..	..	44.9	20.2	9.0	6.7	T. Partridge.
BOLTON	106,500	280	176	44	43	16	9	37	27	36	..	19	4	..	8	3	2	26	16	2	..	34.3	21.5	4.4	3.2	E. Sergeant.
BOOTLE-CUM-LINACRE	26,500	*	47	11	12	4	2	11	7	10	..	2	1	1	4	2	..	11	2	1	..	*	20.9	4.4	4.9	R. J. Sprakeling.
BOSTON†	15,000	51	35	10	2	2	2	9	10	1	..	1	..	..	..	..	..	9	4	3	9	44.3	30.4	0.9	7.8	W. Clegg.
BRADFORD (LANC.)†	15,000	51	25	5	11	2	..	3	4	5	..	..	2	..	1	2	..	2	..	2	..	44.3	21.7	4.3	1.7	J. Hudson.
BRADFORD (YORKS.)†	197,196	486	312	81	65	18	19	82	47	34	..	9	4	..	13	3	5	68	33	8	20	32.1	20.6	2.2	4.5	H. Butterfield.
BRAINTREE	5,000	*	6	..	1	..	1	3	1	..	..	..	..	..	..	..	..	..	1	..	..	*	14.1	0.0	0.0	J. Harrison.
BRENTFORD	11,557	31	17	3	2	1	1	5	5	..	..	..	..	..	..	..	..	3	1	..	..	31.6	17.3	0.0	3.1	J. Williams.
BRIDGNORTH	6,000	12	12	2	..	..	..	3	7	..	..	..	..	..	..	..	..	4	3	..	..	23.5	23.5	0.0	7.8	A. Mathias.
BRIDGWATER	13,000	34	19	2	3	1	3	5	5	2	..	1	..	1	..	..	..	..	2	1	2	30.8	17.2	1.8	0.0	F. J. C. Parsons.
BRIDPORT	8,145	24	17	3	2	4	..	2	6	..	..	..	..	..	..	..	..	6	1	..	3	34.7	24.6	0.0	8.7	G. M. Evans.
BRIGHTON†	107,321	237	155	26	*	*	*	*	40	15	..	8	..	4	1	2	*	*	*	8	27	28.8	18.8	1.8	*	R. P. H. Taaffe, M.D.
BRISTOL†	213,536	603	329	77	*	*	*	*	75	47	..	16	15	3	9	1	3	*	*	19	50	36.8	20.1	2.9	*	C. L. Baylis, M.D.
BROMLEY (KENT)‡	14,293	30	9	2	..	..	..	4	3	..	..	..	..	..	..	..	..	2	..	..	..	21.9	6.6	0.0	1.5	C. O. Baylis, M.D.
BURNLEY†	56,000	*	102	30	22	8	5	26	11	13	..	6	4	..	2	1	..	27	12	2	..	*	23.7	3.0	6.3	T. Dean, M.D.
BURSLEM	29,159	91	46	16	7	1	..	11	11	4	..	..	..	..	4	..	..	7	4	..	..	36.7	18.6	1.6	2.8	J. M. Taylor.
BURTON-UPON-TRENT	33,000	180	57	13	12	5	*	17	10	6	..	..	5	..	..	..	1	10	6	1	6	64.2	20.3	2.1	3.6	C. Perks.
BURY	50,000	127	96	19	16	*	*	*	24	13	..	1	2	..	2	6	2	17	18	..	17	33.1	25.0	3.4	4.4	H. Ashworth.
BURY ST. EDMUNDS	15,600	50	29	8	4	1	..	4	12	3	..	..	1	..	1	..	..	1	4	..	3	37.7	21.9	2.3	0.8	F. W. Clarke.
CAMBORNE	15,000	*	34	8	6	2	3	5	10	4	..	1	1	..	3	..	..	8	3	1	..	*	26.7	3.1	6.3	E. S. Angove.
CAMBRIDGE	34,500	85	37	15	7	2	1	7	5	11	..	..	..	..	9	..	1	8	3	1	2	29.0	12.6	3.8	2.7	B. Anningson, M.D.
CANTERBURY†	20,962	76	46	9	5	2	3	11	16	2	..	11	1	..	..	..	1	15	4	1	10	42.7	25.8	1.1	8.4	F. Wacher.
CARDIFF	82,364	234	133	46	22	5	8	34	18	19	..	..	..	1	3	2	2	25	16	11	13	33.5	19.0	2.7	3.6	H. J. Paine, M.D.
CARLISLE‡	35,000	103	71	17	8	3	2	20	21	8	..	..	1	..	4	3	..	13	6	..	3	48.6	21.2	2.4	3.9	
CARNARVON	10,407	35	37	8	12	2	3	10	2	10	..	9	..	..	..	..	..	5	7	3	..	39.6	41.9	11.3	5.7	H. Rees.
CHELMSFORD	9,700	32	19	4	3	1	2	4	5	4	..	4	..	..	..	..	..	1	3	..	2	38.8	23.1	4.9	1.2	E. H. Carter.
CHELTENHAM‡	45,000	84	61	7	4	2	3	14	31	..	..	..	..	..	..	..	..	12	3	1	7	22.0	16.0	0.0	3.1	T. Wright, M.D.
CHISWICK	12,000	53	17	9	3	..	..	2	3	3	..	..	..	..	3	..	..	2	..	2	..	52.0	16.7	2.9	2.0	F. C. Dodsworth.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MAY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from											Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever.	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
CIRENCESTER	7,000	*	6	1	..	1	..	..	3	..	..	..	..	..	..	..	..	1	..	..	..	*	10.1	6.0	1.7	F. T. Bond, M.D.
COCKERMOUTH†	5,550	*	6	2	..	..	1	1	2	..	..	..	..	..	..	..	..	1	2	..	4	*	14.1	0.0	2.3	J. Ward, M.D.
COLCHESTER	28,924	82	52	10	10	4	3	13	12	2	..	..	..	..	1	1	..	12	6	2	7	33.4	21.2	0.8	4.9	E. Waylen.
CONGLETON	12,000	45	24	6	..	..	2	2	12	..	..	..	..	..	..	..	..	1	5	2	..	48.9	26.1	0.0	1.1	P. M. Davidson.
COSELEY	23,000	70	40	17	20	2	2	5	5	6	..	2	1	..	3	..	..	7	2	..	..	39.7	22.7	3.4	4.0	J. Eagleton.
COVENTRY†	41,000	107	65	16	8	3	6	7	25	3	..	..	2	1	..	..	..	12	5	2	7	34.0	20.7	1.0	3.8	M. A. Fenton, M.D.
COWPEN	5,000	16	8	2	3	2	1	1	..	3	..	2	..	..	1	..	..	1	1	..	..	37.6	18.8	7.1	2.4	H. D. Ward, M.D.
CROMPTON†	8,500	26	14	4	..	..	3	1	6	..	..	..	..	..	..	..	..	3	1	1	..	39.9	21.5	0.0	4.6	W. Brooke, M.D.
CROYDON	70,000	196	91	16	19	5	4	25	22	15	..	8	1	4	1	..	1	8	13	3	11	33.0	15.3	2.5	1.3	C. W. Philpot, M.D., B.Sc.
DAWLISH	3,838	*	11	..	1	..	..	3	7	..	..	..	..	..	..	..	..	..	1	..	..	*	33.7	0.0	0.0	L. Armstrong.
DERBY†	80,385	230	108	31	11	6	5	34	22	2	..	..	1	..	..	1	..	13	15	2	14	37.3	17.5	0.3	2.1	W. Iliffe.
DEVONPORT†	50,000	77	64	11	11	5	3	16	17	9	..	4	..	..	3	2	..	8	4	1	3	20.1	16.7	2.3	2.1	J. May, jun.
DORCHESTER	7,500	27	8	2	..	..	1	2	3	..	..	..	..	..	..	..	..	..	..	..	2	42.4	12.6	0.0	0.0	E. J. Day.
DOVER	33,636	80	34	7	6	1	..	7	13	1	..	..	..	..	..	1§	..	8	2	3	5	33.3	13.2	0.4	3.1	M. K. Robinson, M.D.
DROITWICH	3,600	4	6	1	..	..	..	3	2	..	..	..	..	..	..	..	..	..	..	..	1	13.1	19.6	0.0	0.0	H. Swete, M.D.
DROYLSDEN	8,000	32	20	6	4	..	2	5	3	1	..	..	..	..	1	..	..	4	2	..	..	47.1	29.5	1.5	5.9	R. Slater.
EASTBOURNE	18,000	*	18	3	2	..	2	4	7	..	..	..	..	..	..	..	..	7	1	3	..	*	11.8	0.0	4.6	E. F. Fussell, M.B.
EAST DEREHAM	5,791	18	6	1	..	..	1	2	2	..	..	..	..	..	..	..	..	2	1	..	..	36.6	12.2	0.0	4.1	H. B. Vincent.
FAILSWORTH	8,000	*	14	4	5	1	..	1	3	3	..	3	..	..	..	..	..	7	..	1	..	*	20.6	4.4	10.3	G. W. Beattie, M.D.
FARNHAM	5,000	14	7	..	1	..	..	..	6	1	..	..	..	1	..	..	..	2	..	..	4	32.9	16.5	2.4	4.7	S. G. Sloman, Jun.
FENTON	14,000	60	26	7	4	2	..	7	6	..	..	..	..	..	..	..	..	6	4	..	..	50.5	21.9	0.0	5.0	A. V. Griffiths.
FLEETWOOD	5,000	24	10	2	..	2	2	1	3	..	..	..	..	..	..	..	..	3	..	..	..	56.5	23.5	0.0	7.1	J. Porter.
GARSTON†	8,500	18	11	1	3	1	..	4	2	1	..	..	..	..	1	..	..	4	2	1	..	27.6	16.9	1.5	6.1	J. A. Fisher.
GLOSSOP†	18,697	49	23	3	3	..	1	3	13	4	..	..	2	..	1	1	..	3	2	..	..	34.2	16.0	2.8	2.1	J. Rhodes.
GLOUCESTER	37,907	120	57	9	9	5	3	17	14	6	..	5	..	..	1	..	..	13	2	2	12	37.3	17.7	1.9	4.0	J. P. Wilton.
GOOLE	10,205	45	13	3	2	2	1	3	2	3	..	1	1	..	..	..	1	3	1	1	2	51.9	15.9	3.5	3.5	J. Mitchell Wilson, M.B.
GORTON†	32,000	101	55	16	12	2	5	13	7	5	..	1	3	..	..	1	..	11	5	..	..	41.1	22.4	2.0	4.5	R. E. Hammond.
GREAT DRIFFIELD	6,033	18	15	..	2	1	1	6	5	1	..	1	..	..	..	..	..	4	..	1	..	35.5	29.3	2.0	7.8	D. Ridpath, M.D.
GUILDFORD	10,167	23	13	2	1	..	3	5	2	..	..	..	..	..	..	..	..	..	3	..	..	26.7	15.1	0.0	0.0	J. Morton, M.D.
HALIFAX†	72,000	183	134	36	17	*	*	25	33	11	..	5	3	..	..	2	1	35	10	3	21	33.1	24.3	2.0	6.3	D. Ainley.
HARBORNE	6,000	11	3	..	..	..	..	2	1	1	..	..	..	..	..	1	..	..	..	..	..	21.6	5.9	2.0	0.0	R. W. Smith, M.D.
HARWICH†	7,100	32	9	2	..	..	..	2	5	..	..	..	..	..	..	..	..	2	1	..	..	58.7	16.5	0.0	3.7	A. K. Morgan.
HASLINGDEN†	8,450	30	17	7	..	1	..	4	5	3	..	..	..	..	1	2	..	1	1	..	..	46.3	26.2	4.6	1.5	J. A. Harrison, M.D.
HEYWOOD	23,000	*	46	8	5	4	4	15	10	2	..	..	1	..	..	..	1	7	4	1	..	*	23.6	1.0	3.6	H. Wisken.
HINCKLEY	7,500	22	15	8	1	1	1	..	4	..	..	..	..	..	..	..	..	2	3	..	..	34.5	23.5	0.0	3.1	W. H. Griffiths.
HINDLEY	12,000	38	43	6	22	3	2	5	5	15	..	1	12	..	..	1	1	5	2	..	1	41.3	46.7	16.3	5.4	J. G. Brayton.
HORWICH	4,315	8	6	1	1	..	1	1	2	..	..	..	..	..	..	..	..	..	1	1	..	21.9	16.4	0.0	0.0	G. H. Whitaker.
HUDDERSFIELD†	81,780	196	150	39	23	*	*	33	38	9	..	5	1	..	1	1	1	27	18	4	16	31.2	23.9	1.4	4.3	J. S. Cameron, M.D., B.Sc.
HULL†	149,627	443	211	53	*	*	*	*	34	28	..	11	7	1	..	2	7	*	*	6	23	38.6	18.4	2.4	*	J. F. Holden.
HYDE	28,125	84	64	24	15	4	6	2	12	22	..	9	8	1	..	3	1	10	3	..	..	35.2	26.8	9.2	4.2	J. Nield Cooper.
ILFRACOMBE	5,500	4	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..	1	1	..	..	8.6	4.3	0.0	2.1	E. J. Slade-King, M.D., S.Sc.C.
ILKESTON‡	12,356	76	33	16	6	..	1	6	4	8	..	3	..	..	..	2	3	2	4	..	..	64.1	27.8	6.8	1.7	R. Wood.
IPSWICH	47,414	108	74	8	13	*	*	*	30	4	..	..	..	1	3	..	..	8	9	2	6	26.8	18.4	1.0	2.0	G. S. Elliston.
KEIGHLEY	24,000	65	51	14	8	1	1	18	9	1	..	..	1	..	..	..	..	12	6	..	1	31.9	25.0	0.5	5.9	A. Roberts.
LEAMINGTON	24,500	62	30	6	7	1	1	10	5	..	..	..	..	..	..	..	..	5	5	1	4	29.8	14.4	0.0	2.4	J. S. Baly.
LEEDS	318,929	908	441	119	72	*	*	*	116	30	..	2	8	1	7	4	8	100	32	27	*	33.5	16.3	1.1	3.7	G. Goldie.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.
§ This death was of a person recently arrived from the Continent.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MAY 1880—(*Continued.*)

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births.	Deaths.	Deaths of Persons aged						Deaths from										Deaths in Public Institutions.	Annual rate per 1000 persons living.				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases.	Small-pox.	Measles.	Scarlet fever	Diphtheria.	Whooping-cough.	Fever (typhus, enteric, gastric, and simple)	Diarrhœa.	Diseases of the respiratory organs.	Phthisis.	Violence.		Births.	Deaths.	Deaths from seven zymotic diseases.	Deaths from diseases of respiratory organs.	
Leek	12,527	38	33	5	6	3	1	11	7	4	..	2	1	..	1	..	..	8	3	1	3	35·7	31·0	3·8	7·5	J. J. Ritchie.
Leicester	129,912	395	179	50	*	*	*	*	32	23	..	14	4	..	1	..	4	*	*	9	18	39·7	18·0	2·3	*	W. Johnston, M.D.
Leigh	20,400	98	44	12	6	3	2	9	12	4	..	..	1	..	..	1	2	9	2	..	..	56·5	25·4	2·3	5·2	J. Hall.
Lichfield	8,129	14	23	4	2	..	..	4	13	1	..	..	..	..	..	1	..	7	..	..	..	29·3	33·3	1·4	10·1	G. A. Carter, M.D.
Lincoln†	32,103	113	53	16	14	3	1	12	7	6	..	..	3	..	3	..	..	6	8	..	6	45·9	21·5	2·4	2·4	C. Harrison, M.D., S.Sc.C.C.
Littlehampton	4,000	10	4	..	..	..	1	2	1	..	..	..	..	..	..	..	..	1	1	..	..	29·4	11·8	0.0	2·9	C. Kelly, M.D.
Liverpool†	544,056	1628	1103	278	264	58	48	306	149	156	..	19	31	4	68	18	16	266	116	47	157	39·0	26·4	3·7	6·4	J. S. Taylor, M.D.
Liversedge	13,750	42	29	10	5	1	1	4	8	..	..	..	..	..	..	..	..	6	..	..	..	36·0	24·8	0.0	5·1	W. J. Sykes, M.D.
Luton	24,200	63	37	8	4	1	1	5	18	3	..	..	..	..	2	..	1	5	2	1	10	30·7	18·0	1·5	2·4	H. Sworder.
Lytham	5,000	12	10	1	1	1	..	3	4	..	..	..	..	..	..	..	..	3	1	2	1	28.2	23·5	0.0	7·1	W. E. Pountney, M.B.
Macclesfield	36,641	100	65	8	8	2	4	21	22	1	..	..	..	..	..	1	..	17	13	3	17	32·1	20·9	0·3	5·5	G. Bland.
Maidenhead	8,281	24	8	2	2	1	..	1	2	2	..	..	1	..	..	..	1	..	..	..	..	34·1	11·4	2·8	0.0	W. T. G. Woodforde, M.D.
Maidstone†	29,537	85	37	9	9	4	1	6	8	3	..	2	1	..	..	..	..	7	3	..	8	37·5	16·3	1·3	3·1	M. A. Adams.
Manchester†	363,130	968	737	188	*	*	*	*	104	121	..	25	29	1	41	11	14	246	*	24	122	34·8	26·5	4·3	8·8	J. Leigh.
Merthyr Tydfil†	52,000	112	82	15	10	5	10	26	16	7	..	4	..	..	1	2	..	21	4	1	5	28.1	20.6	1·8	5·3	T. J. Dyke.
Middlesbrough	58,988	172	89	18	22	9	4	23	13	20	..	..	9	..	6	1	4	18	12	2	8	34·3	17·8	4·0	3·6	J. A. Malcomson, M.D.
Middleton and Tonge‡	16,700	66	25	4	3	2	..	12	4	3	..	1	..	..	2	..	..	1	3	2	..	41.2	15.6	1·9	0.6	T. B. Knott.
Morley	12,100	56	27	13	2	2	2	4	4	..	..	..	..	..	..	..	..	6	3	2	..	54·5	26·3	0.0	5·8	S. T. Steele, S.Sc.C.Camb.
Neath	12,000	27	19	3	4	1	1	4	6	2	..	..	2	..	..	..	..	2	3	1	1	26·5	18.6	2.0	2.0	G. Ryding, M.D.
Newark†	13,746	42	23	5	2	..	1	7	8	2	..	1	..	..	..	..	1	5	3	..	1	39·8	21·8	1·9	4·7	A. Ashby, M.B.
Newbury	9,796	21	14	2	2	..	..	6	4	2	..	..	..	..	1	1	..	2	..	2	1	25·2	16·8	2·4	2·4	W. T. G. Woodforde, M.D.
Newcastle-under-Lyme	18,000	67	33	9	6	2	2	6	8	2	..	..	..	..	1	1	..	4	4	..	..	48.5	23·9	1·4	2·9	St. J. Edwards, M.D.
Newcastle-upon-Tyne†	149,366	413	239	68	47	*	*	*	40	24	..	1	6	1	13	2	1	49	25	10	34	36.0	20·9	2.1	4·3	H. E. Armstrong.
Norwich†	85,827	216	141	34	*	*	*	*	49	26	..	3	15	1	3	1	3	*	*	3	17	32.8	21.4	4.0	*	T. W. Crosse.
Nottingham†	173,627	530	296	77	67	18	17	49	68	48	..	20	7	..	10	7	4	52	27	6	22	39·8	22.2	3.6	3·9	E. Seaton, M.D.
Nuneaton	7,400	41	15	5	..	..	..	8	2	..	..	..	..	..	..	..	..	5	2	1	..	65·3	23·9	0.0	8.0	E. Peacock.
Oldham†	115,413	334	171	39	41	12	8	37	34	19	..	7	8	..	3	..	1	55	14	3	15	37·7	19·3	2.1	6.2	J. M. Sutton, M.D.
Oxford‡	37,500	102	70	13	7	3	5	23	19	3	..	1	2	..	..	..	..	14	9	3	11	28.4	19·5	0.8	3·9	A. Winkfield.
Pembroke	15,000	23	14	2	..	..	..	5	7	..	..	..	..	..	..	..	..	2	3	..	..	18.1	11.0	0.0	1.6	D. P. Saer.
Penzance	12,000	23	14	3	4	1	1	..	5	3	..	..	..	..	3	..	..	5	1	..	..	22.6	13.7	2.9	4·9	G. B. Millett.
Peterborough†	22,000	87	34	11	7	1	..	8	7	5	..	1	..	..	2	1	1	3	2	1	..	51.5	20.1	3.0	1.8	W. Thomson, M.D.
Plymouth†	74,993	197	100	36	65	8	6	29	16	65	..	58	..	1	3	1	2	18	12	1	14	34·2	27.8	11.8	3.1	H. Greenway.
Poole	11,350	39	20	6	1	2	1	5	5	1	..	..	..	..	..	..	1	3	2	1	..	40.5	20.7	1.0	3.1	H. A. Lawton.
Portsmouth†	134,224	316	195	47	33	10	10	59	36	26	..	11	..	2	3	7	3	30	26	5	26	27.7	17.1	2.3	2.6	G. Turner.
Preston‡	88,000	320	243	64	64	13	13	51	38	27	..	..	9	3	6	3	6	50	21	6	8	37·9	28.8	3.2	5·9	H. O. Pilkington.
Ramsgate†	22,200	61	32	10	..	4	2	9	7	6	..	..	2	..	2	2	..	3	1	2	..	35·8	18.8	3·5	1·8	R. Lyddon (Deputy).
Reading†	41,500	124	48	14	4	5	5	9	11	4	..	..	..	..	2	1	1	4	4	..	6	38·9	15.1	1.3	1.3	J. Shea, M.D.
Redditch	10,070	27	9	2	1	1	..	2	3	1	..	..	..	1	..	..	..	1	1	..	..	31.6	10.5	1.2	1.2	H. M. Page, S.Sc.C.Camb.
Redruth	9,500	18	12	..	3	2	1	2	4	1	..	..	1	..	..	..	..	6	3	..	..	22.3	14·9	1.2	7·4	J. S. Hichens.
Reigate	18,000	*	25	6	3	1	2	7	6	..	..	..	..	..	..	..	..	2	2	2	..	*	16.4	0.0	1.3	E. L. Jacob.
Richmond (Surrey)	19,500	41	39	10	8	2	1	8	9	10	..	..	4	..	5	1	..	8	5	1	5	24.8	23.6	6.0	4.8	J. T. Rowland, M.D.
Rochdale	72,720	152	105	31	17	2	7	28	20	9	..	2	1	..	4	2	..	26	16	..	..	24.6	17.0	1.5	4.2	J. Henry, M.D.
Rochester	18,500	55	25	5	3	..	2	10	5	3	..	1	..	..	2	..	..	8	..	3	6	35.0	15.9	1.9	5.1	J. Sladen-Knight, M.D.
Romsey	4,481	7	3	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	18.4	7.9	0.0	0.0	F. Buckell.
Rotherham	34,404	92	64	15	15	5	4	8	17	11	..	1	5	2	..	..	3	*	*	*	*	31.5	21.9	3.8	*	J. Hardwicke, M.D.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.

† The Statistics for these Sanitary Districts relate to four weeks, or 28 days.

‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.

MORTALITY STATISTICS OF URBAN SANITARY DISTRICTS FOR THE MONTH OF MAY 1880.—*Continued.*

Urban Sanitary Districts.	Estimated Population in middle of 1880.	Births	Deaths	Deaths of Persons aged						Deaths from										Deaths in Public Institutions	Annual rate per 1000 Persons living				Medical Officers of Health.
				0—1 year	1—5 years	5—15 years	15—25 years	25—60 years	60 years and upwards	Seven principal zymotic diseases	Small-pox	Measles	Scarlet fever	Diphtheria	Whooping-cough	Fever (typhus, enteric, gastric, and simple)	Diarrhœa	Diseases of the respiratory organs	Phthisis	Violence		Births	Deaths	Deaths from seven zymotic diseases	Deaths from diseases of respiratory organs	
Rowley Regis‡	27,000	138	60	29	15	1	..	9	6	7	..	3	..	..	..	..	4	20	2	4	..	53.3	23.2	2.7	7.7	J. G. Beasley.
Rugby	8,916	21	5	3	..	..	..	2	..	1	..	..	..	..	..	..	1	1	..	..	..	27.7	6.6	1.3	1.3	G. Wilson, M.D.
Runcorn	14,000	50	24	5	2	2	1	4	7	2	..	..	..	..	..	1	1	8	1	1	..	42.1	20.2	1.7	6.7	R. H. Mouritz.
Rusholme‡	12,500	22	10	3	2	2	..	2	1	3	..	..	2	..	..	1	..	1	2	..	..	18.4	8.4	2.5	0.8	J. Gregory.
Ryde	12,800	*	23	3	3	..	2	5	10	..	..	..	..	..	..	..	..	8	3	1	..	*	21.2	0.0	7.4	A. Platt Wilks, M.B.
Salford†	185,786	560	399	96	91	34	23	103	52	89	..	10	38	2	22	10	7	90	37	11	57	39.3	28.0	6.2	6.3	J. Tatham, M.D., S.Sc. C. Camb.
Selby	5,720	14	10	3	..	1	*	*	2	..	..	..	..	..	..	..	..	..	1	..	2	28.8	20.6	0.0	0.0	J. Mitchell Wilson, M.B.
Sheffield†	304,938	868	512	142	104	*	*	*	81	72	1	5	27	2	16	14	7	120	45	4	44	37.1	21.9	3.1	5.1	T. W. Hime, B.A. M.B.
Sittingbourne‡	9,000	37	9	2	2	..	..	3	2	1	..	..	1	..	..	..	..	3	..	..	..	42.9	10.4	1.2	3.5	H. G. Sutton.
Smethwick†	21,000	80	35	11	4	2	1	9	8	3	..	..	2	..	..	..	1	7	2	..	..	49.7	21.7	1.9	4.3	W. Sutton.
Southport	34,100	66	53	10	4	2	4	15	18	2	..	..	..	..	2	..	..	8	6	..	3	22.8	18.3§	0.7	2.8	H. H. Vernon, M.D.
Stalybridge	23,405	73	38	5	9	..	3	13	8	5	..	2	2	..	1	..	..	24	6	..	..	36.7	19.1	2.5	12.1	F. J. Roberts-Dudley.
Stratford-on-Avon	7,899	*	16	5	..	2	..	5	4	1	..	1	..	..	..	..	..	2	1	..	5	*	23.8	1.5	3.0	G. H. Fosbroke, S. Sc. C. Camb.
Stroud	7,665	28	11	3	1	..	..	*	5	1	1	..	..	..	..	..	..	3	..	..	2	43.0	16.9	1.5	4.6	T. Partridge.
Sunderland†	116,730	361	202	43	65	*	*	*	26	53	..	26	10	..	6	3	7	35	13	6	18	40.4	22.6	5.8	3.9	H. J. Yeld, M.D.
Swansea	65,890	217	178	34	70	23	7	22	22	71	..	51	16	..	..	2	2	32	13	5	8	38.8	31.8	12.7	5.7	E. Davies.
Swinton	7,753	41	14	..	6	1	1	4	2	1	..	..	..	..	..	..	1	1	3	1	..	46.0	15.7	1.1	1.1	C. S. Blythman, M.B.
Tamworth	4,846	14	7	1	3	..	2	1	..	2	..	..	2	..	..	..	..	1	1	..	..	34.0	17.0	4.9	2.4	H. J. Fausset, M.D.
Taunton	16,227	54	27	4	..	1	2	8	12	..	..	..	..	..	..	..	..	10	5	2	3	39.2	19.6	0.0	7.3	H. J. Alford, M.D.
Teignmouth	7,000	12	6	2	1	..	..	2	1	..	..	..	..	..	..	..	..	2	1	..	..	20.2	10.1	0.0	3.4	W. C. Lake, M.D.
Tewkesbury	5,500	20	10	1	..	..	..	3	6	..	..	..	..	..	..	..	..	2	..	1	1	42.8	21.4	0.0	4.3	W. Allard.
Tiverton†	10,500	30	11	..	..	2	..	4	5	1	..	..	..	..	..	1	4	..	..	1	1	37.3	13.7	1.2	5.0	J. P. McNeill, M.D.
Torquay†	26,000	*	31	8	7	1	..	8	7	5	..	2	..	..	3	..	..	4	2	..	..	*	15.5	2.5	2.0	P. Q. Karkeek.
Tottenham†	37,000	122	49	10	6	4	2	17	10	6	..	2	..	..	3	1	..	6	7	1	..	43.0	17.3	2.1	2.1	C. T. Conolly.
Toxteth Park	8,000	21	8	1	1	2	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	30.9	11.8	0.0	0.0	R. W. Pendleton.
Tredegar	18,000	76	37	4	2	4	2	14	11	..	..	..	..	..	..	..	..	8	8	4	2	49.7	24.2	0.0	5.2	G. A. Brown.
Trowbridge†	12,000	28	16	4	1	..	1	4	6	1	..	..	1	..	..	..	..	2	3	..	..	30.4	17.4	1.1	2.2	G. C. Taylor, M.D.
Truro	11,049	24	13	3	2	1	1	1	5	3	..	..	..	..	1	1	1	1	1	..	2	25.6	13.9	3.2	1.1	E. Sharp.
Tunstall	15,500	48	20	4	1	..	..	10	5	..	..	..	..	..	..	..	..	8	1	2	..	40.4	16.8	0.0	6.7	J. P. Edwards.
Ulverston	11,000	37	20	2	3	2	3	3	7	2	..	..	..	..	..	1	1	5	3	..	3	39.6	21.4	2.1	5.4	A. Thompson, M.D.
Walker-on-Tyne	8,000	24	16	7	4	1	1	1	2	5	..	..	..	..	5	..	..	3	1	1	..	35.3	23.6	7.4	4.4	H. F. Hurst.
Wallasey†	20,000	43	39	8	5	5	3	12	6	4	..	..	..	3	..	..	1	5	6	2	1	28.0	25.4	2.6	3.3	I. Byerley.
Warrington‡	40,000	168	76	25	13	4	1	17	16	5	..	1	..	..	1	2	1	15	9	2	8	43.8	19.8	1.3	3.9	G. W. Joseph.
Wednesbury†	26,000	65	38	9	8	3	3	6	9	9	..	..		..	1	3	2	5	3	..	..	32.6	19.0	4.5	2.5	J. C. Garman.
West Bromwich†	54,000	175	80	26	12	*	*	*	17	8	..	..		..	2	..	3	*	..	..	..	42.3	19.3	1.9	*	J. Manley.
West Derby	33,639	76	38	6	8	4	3	12	5	2	..	..	..	..	1	1	..	6	2	..	1	26.6	13.3	0.7	2.1	W. Carter, M.D.
Weston-super-Mare	14,000	25	19	7	1	2	2	3	4	2	..	..	1	..	1	..	..	2	2	1	..	21.0	16.0	1.7	1.7	C. B. Hitchins.
Weymouth	15,269	35	20	5	2	..	..	4	9	..	..	..	..	..	..	..	..	3	1	..	6	27.0	15.4	0.0	2.3	H. Tizard, M.D.
Widnes	22,000	104	33	13	6	..	..	13	1	3	..	..	..	..	1	..	2	9	1	..	..	55.7	17.7	1.6	4.8	W. Cooper.
Willenhall†	19,300	51	33	17	2	2	3	5	4	5	..	..	1	..	..	1	3	8	2	..	..	34.3	22.2	3.4	5.4	W. H. Hartill.
Withington	15,000	51	20	5	6	2	1	4	2	4	..	..	1	2	1	..	..	2	2	..	..	40.0	15.7	3.1	1.6	T. C. Railton, M.B.
Wolverhampton‡	76,000	271	142	37	30	4	5	36	30	21	..	1	7	..	11	1	1	29	11	8	21	37.2	19.5	2.9	4.0	J. H. Love.
Workington†	10,000	*	16	4	4	1	..	6	1	3	..	3	..	..	..	..	..	..	1	1	..	*	20.9	3.9	0.0	J. Ward, M.D.
Worthing	9,540	28	8	..	..	1	..	3	5	1	..	..	1	..	..	..	..	3	..	1	1	34.6	9.9	1.2	3.7	C. Kelly, M.D.
York	46,850	173	77	14	14	6	2	25	16	8	..	3	2	..	..	..	3	10	13	1	4	38.5	19.4	2.0	2.5	S. W. North.

* The necessary information for these columns was for various reasons not supplied by the Medical Officers of Health.
† The Statistics for these Sanitary Districts relate to four weeks, or 28 days. ‡ The Statistics for these Sanitary Districts relate to five weeks, or 35 days.
§ The death-rate, exclusive of the deaths of moribund visitors, was 15.92.

whether the death in that town certified as the result of small-pox was really a fatal case of that disease. Measles showed fatal epidemic prevalence in Bolton, Carnarvon, Chelmsford, Hyde, Plymouth, and Swansea. The fatal cases of scarlet fever were proportionately excessive in Altrincham, Audenshaw, Barnsley, Burton-upon-Trent, Hindley, Hyde, Middlesborough, and Swansea. Diphtheria was assigned as the cause of three deaths in Wallasey, and of two in Withington. The deaths referred to fever (mainly enteric) were proportionately more numerous in the smaller than in the larger town districts. Among those towns in which the annual death-rate from fever very much exceeded the average, the following may be mentioned:—Ashton-under-Lyne, Bilston, Bradford (Lancas.), Carlisle, Haslingden, Hyde, Ilkeston, Ramsgate, Bury, and Wednesbury; in none of these districts, however, did the deaths referred to fever during May exceed three.

The annual death-rate from diseases of the respiratory organs (not including phthisis) averaged 3.5 per 1,000 persons living in those of the 181 sanitary districts for which this information is available; in the two preceding months the rate from these diseases averaged 4.6 and 4.7 per 1,000. During May the death-rate from lung diseases showed a marked excess in Ryde, Leek, Boston, Bridgnorth, Driffeld, Rowley Regis, Nuneaton, Canterbury, Bridport, Failsworth, and Stalybridge; in the two last-mentioned sanitary districts the rate was equal to 10.3 and 12.1 respectively. Many of these towns also showed an excessive fatality of lung diseases in April.

Infant mortality, measured by the proportion of deaths under one year to births registered, averaged 131 per 1,000 in the aggregate of the sanitary districts for which the information is available; in the twenty larger towns the death-rate of infants averaged 136 per 1,000, against 166, 148, and 139 in the three preceding months. In London, infant mortality, which had been equal to 178, 142, and 128 in the three preceding months, did not exceed 109 during May, whereas it was not less than 152 in the nineteen provincial towns. In many of the smaller sanitary districts, however, the proportion of infant mortality again showed a marked excess last month; the rate exceeded 200 per 1,000 in Coseley, Haslingden, Hinckley, Hyde, Ilkeston, Keighley, Liversedge, Richmond (Surrey), Rochdale, and Rowley Regis.

The table of mortality statistics for May includes, as did the table for April, the following sixteen watering-places or health-resorts:—Bangor, Brighton, Dawlish, Dover, Eastbourne, Ilfracombe, Littlehampton, Penzance, Ramsgate, Ryde, Southport, Teignmouth, Torquay, Weston-super-Mare, Weymouth, and Worthing. The average annual death-rate during May in those sixteen watering-places, did not exceed 16.5, and the zymotic death-rate was but 1.3 per 1,000 of the estimated population. These statistics afford the most conclusive evidence of the generally satisfactory sanitary condition of these health and holiday resorts. We should be glad to see a larger number of our English and Welsh watering-places contribute to our table these monthly statistics, which at this season of the year possess especial value and interest for those who may now be debating the choice of a holiday resort. Exclusive of Brighton, for which unfortunately this information is not available, the death-rate from diseases of the respiratory organs during May in these sixteen watering-places did not exceed 3.2 per 1000; in the aggregate of the sanitary districts in our list, furnishing the information, it averaged 3.5 per 1,000.

SPECIAL REPORTS.

CONFERENCE ON THE PROGRESS OF PUBLIC HEALTH.

THE fifth Annual Conference on the progress of Public Health in connection with the Society of Arts, was held at the Society's rooms, John Street, Adelphi, on June 10 and 11, the Rt. Hon. James Stansfeld M.P., in the chair. Amongst those who were present and addressed the meeting were Lord Alfred Churchill (Chairman of Council), Mr. Ernest Hart (Chairman of the Parliamentary Bills Committee of the British Medical Association), Mr. C. W. Cresswell, Dr. Lucas, Mr. Chadwick, Mr. Gould (Kingston-on-Thames), Mr. Adolphe Smith, Dr. Bond, Dr. Alcock, Dr. Robinson (Dover), Professor Way Dr. Owen (Exeter), Mr. Galton, Dr. Tripe, Dr. Carpenter (Croydon), Mr. Wright, Mr. Domwell, Mr. Vacher, Mr. Robert Rawlinson, C.B., Mr. Taylor (Shipley), and Mr. Batten, C. E. (Birmingham).

The Rt. Hon. James Stansfeld, M.P. (Chairman), in opening the proceedings, said this was the fifth Annual Conference on the subject of the health of towns, sanitary, legislative and administrative, over which it had been his privilege to preside. They had discussed a variety of subjects, special and general, technical, legislative and administrative, and the Executive of the Conference of the Society of Arts had come to the conclusion that it might be advisable to recapitulate in the programme of that day some of the conclusions arrived at at one or more of those previous Conferences, and the results which had been arrived at concerning them. The results they had in the programme before them, which was divided into certain heads: 1. That of administrative organisation, local and imperial, for sanitary purposes; 2. Practical amendment of sanitary law; 3. Sanitary inspection and classification of dwellings; 4. Further suggestions by sanitary authorities. First, it was his duty to say to them that, in publishing this programme, the Council of the Society of Arts desired it to be understood that they were not committed to any of the ideas which might seem to be implied by the four propositions which were submitted for their discussion. But the subjects which had already been discussed in previous Conferences were considered worthy of re-discussion; for instance, all those matters which came under the first great head of administrative organisation formed part of one of the greatest subjects they could discuss in regard to the local government of the country. If they took the programme and referred to Clauses 4 and 4 B, they would find the suggestion that the administrative organisation of the Local Government Board should be 'strengthened, whilst diminishing centralisation and correspondence, by mapping out England and Wales into a few large areas, each area to be under the administration of a staff of inspectors, the whole under the superintendence of a permanent head of the department, properly assisted and relieved of secretarial work'. That was a suggestion which had emanated from himself as Ex-President of the Local Board so long ago as in their first Conference of 1876. He referred to it as showing the general propositions with which they set out. With regard to the whole of the rest of the great head of administrative organisation, they were matters discussed in the Conferences of 1877 and 1878. The growth of this

question in their minds and in their discussions from its beginning, had been to him a subject of very interesting observation. They began in 1876, calling it a Conference of the Health and Sewage of Towns, and the whole question was taken up with the view they had taken of the dry and wet systems of disposing of the sewage of towns. They did not begin with the health of towns, but the health of towns affected by the sewage of towns. That matter rapidly enlarged itself, and, by the year 1877 they found themselves face to face with a very different question. In the course of their discussion in the following two years, they were continually met by the difficulty raised by practical and scientific men of ensuring the adoption of sanitary laws because of the apathy of the inhabitants of the localities affected. The great result of their first two years' conferences and discussions was a sense of that difficulty, and by the end of 1877 they were, so to say, fairly abreast of the problem as to the best way in which it was to be met. Now, scientific men said what they had to do, if men were ignorant and apathetic, was to change the verb *may* into the verb *must*, and to compel the authorities to carry out the sanitary laws, which it appeared they were not willing or ready to carry out without compulsion. That was the suggestion which came from the scientific mind—the mind charged with and fixed on the idea of procuring, as soon as possible, the successful establishing of useful law; but a little reflection showed that that was not, and could not practically be, the remedy; for if they did so, and called upon the imperial power of the Local Government Board to compel them to execute some specific work, the inevitable result would be that no men of character or independence would consent to serve upon those Boards which had the centralisation of authority in London. They had to take their choice of two principles, either to address themselves to the Local Authorities, and get their co-operation, or adopt the principle of centralisation, and rule everything from the imperial department in the metropolis. Now, politically speaking, that was impossible; no politician would attempt to defend such a principle as that; it was as practically impossible as it was politically impossible. The country would not accept it. Other suggestions were made in the year 1877. Mr. Cresswell, read a paper which contained some very practical suggestions, and in which he noted some evils which rendered impossible the efficient application of sanitary laws. He noted the independence of the owners of small cottage property. This led him to suggest the ballot, and they found themselves suddenly out of the region of the laws of health, and face to face with what simply seemed to be a political question, viz., that of the law of ballot. The ballot presented itself as a method to avoid undue and unfavourable influence of the owners of small cottage property. Mr. Cresswell noted a common thing, of which they had had ample evidence—the want of independence of the Local Medical Officer of Health. That was not a matter of observation on their part, but of conviction. They had over and over again said, 'You place us in a false and untenable position; you subject us to difficulties and trials to which we ought not to be subjected. If we endeavour to carry out these laws, we make ourselves obnoxious to the clients who support us in our medical practice. We want, therefore, some protection, or some higher authority, to whom we can refer questions of this sort.' Now, in reference to that universally-admitted difficulty, the suggestion of Mr. Cresswell was that there should be appointed County Medical Health Inspectors, that was to say, highly educated and competent men appointed over a large district, and well and sufficiently paid for their time. That was entirely upon the lines of the Act it had been his (the Chairman's) privilege to pass. At the end of the Conference of 1877, he ventured to suggest that the time had come when they might deal specifically with the subject of legislation, which might be required to meet and overcome all these difficulties, and, in following out that suggestion in the course of the next year, he gave expression to certain general views and warnings, to which, perhaps, he might be allowed to refer, and which, he thought, would not be inappropriate to that occasion. They had been discussing how to apply the law to which the people were so unwilling to comply. He (the Chairman) then said that the sanitary question was, after all, an educational question; they could not well hope to succeed in applying sanitary law, unless they used all means in getting the people to give their willing help and support. The principle which he laid down was not that which had often been placed before him by scientific men, and medical men especially, to make the law compulsory, saying things should be done, and bringing down the central authority if the local authority would not comply. That was the scientific view; but practically, legislators had to think of something else, not only of bringing into immediate operation a law of that kind, but its acceptability. He laid down, therefore, that the problem was educational; the habits of the people could not be controlled unless they were enlisted in the work, and too much confidence not placed in a law supported by central authority.

It had been a subject of great interest to him to note the manner in which from small beginnings their discussions had enlarged themselves by some kind of spontaneous process until they found how they embraced the whole of the great question of administrative organisation. They had discussed the ballot from a specific point of view. He wanted it for the protection of small cottage property, and, in discussing that question of the ballot, they speedily found that two questions were raised—the question of convenience, and, having got upon that question, they naturally got a little further. The people felt the inconvenience of the multiplicity of local authorities, and the multiplicity of elections for local authorities, and so they passed on to have one day in the country for the election of all local bodies whatsoever. It was an extremely simple proposition, and an extremely practical one, and would very largely decrease the time, trouble, and expense of the inhabitants of the district. There were certain propositions which he had initiated, and he would like to refer to them on the present occasion: first, he found an omission under the head of central districts (second head), viz., that the unit of area should be as large as convenient and practicable; the most of them had arrived at that conclusion on a former occasion. If it was unadvisable that local boards should consist to any large extent of owners of small property, it was also unadvisable that very small areas should exist, because then they experienced the difficulty of finding really intelligent men to serve on the board. Under the old Local Governing Acts before the passing of the Local Government or Public Health Act, it used to be in the power of localities voluntarily to adopt a system of local government; and, under those conditions, there were created,

especially in the manufacturing districts, a large number of very small local governing districts, and that they found to be a great evil, because they could not possibly have an independent governing body in a small district of 300 or 400 people only. They had discussed before, and should discuss again, the advisability of having an area as large as possible.

The next proposition they came to which had been discussed before was the advisability of making the governing body of this unit or area a governing body for all local governing purposes. That might seem a very abstract idea, but he would tell them that it was a very practical one. The object was this; there were many intelligent men who did not care to go on a governing board to discuss questions of foundations of houses, but who took great interest in other matters of local government. He thought it was a question which ought to recommend itself to their minds, first of all on account of its simplicity, and secondly for the sake of getting the best men they could on the local governing board of a broad area; that to that area all the local governing functions for which it was fit should be given. Having got so far, they found themselves face to face with the question what they were to do with regard to functions which required a larger area? There was one thing that they could do, viz., that in constituting their larger area it should be an aggregate of the smaller; they should never allow the lines to cross; they would find that there was no practical difficulty in carrying that out. That brought them to the great subject with which they had headed their discussion that day, County Boards. With regard to that body, he thought a County Board was needed to manage the roads, the bridges, the county lunatic asylums, and not at all improbably in the future, county workhouses—he did not lay that down as absolute; perhaps, if they had a County Area and a County Board, they might classify the workhouses, and place them under the committee of a County Board, which would be a very great advantage indeed—they wanted County Boards for the conservancy, and prevention of the pollution of rivers. Through the County Board they would find themselves immediately securing the appointment of highly paid and really independent officers of health, the necessity for whose appointment Mr. Cresswell had propounded in the paper to which he had referred. He had been endeavouring to trace the progress which had been made during the last two or three years, and they had come now to the consideration of the County Boards, which he regarded as the crowning part of the edifice, so to say. They found the whole character of the problem had taken a higher status, and was given healthy and more vigorous life, which would have an individuality of its own, and would lend support and strength to everyone of the minor subordinate bodies within the area. The whole system would be strengthened and pervaded by a higher tone, and, to use the expression, the centre of gravity of imperial self-government would be distinctly changed, and revert nearer to the principle of local self-government than to imperial centralisation. On the other side, the nature of imperial supervision would immediately be affected and most beneficially altered in the minds and in the practice of imperial administrators; and a most dangerous tendency to centralisation would receive its only possible check. An imperial department, dealing only with small local bodies who could not be trusted to carry out efficiently the law, which it was the duty of the imperial party to see carried out, must centralise and continually interfere. The only remedy was the creation of large boards such as County Boards. In his opinion, that change could be to a large extent effected immediately. He had very distinct opinions as to the methods of organisation and administration, acting on the plan that they must deal with men through men, do as little as possible with correspondence, and respect the men with whom they had to deal. Lastly, there were still two wider aspects of that question. The first was the educational question. They must have the educated co-operation of individuals as well in local governing bodies if they wished to have a thoroughly well and efficiently administered and applied sanitary law. The laws of health were, for the most part, to be the education of the children of the people. If they had at some future time a local governing body, undertaking as one of the ordinary functions the education of the children of the locality, it would follow simply, easily, and logically, that they would find it their duty to teach the simple laws of health to the children of the people. A local institution of a representative character, where they would respect their independence, would, whilst they were learning their own task, tend to educate the people. Every aspect of the question, however wide, was political. There was a growing conviction in the minds of all men, of all parties and connections, that the duties of the Imperial Parliament should be lightened. In one sense, Home Rule was coming to be a question for England, Scotland, and Ireland; but that was not an aspect of the question which directly concerned them as sanitary reformers. He simply noted it for their own reflection, that they might keep it in their minds and consciences. Those were considerations which, in all probability, would tend to larger schemes of local government in the creation of county boards in the hands of the present administration than they would if they were considered simply from their point of view, and should that be the case, many other questions would be pressed upon the Government when that question came to be dealt with by them; and they, as sanitary reformers, might rest perfectly satisfied, the wider the scheme, the more elevated would be the point of view. Whatever motives might induce an enlargement of the scheme, the wider the scheme which might be passed by the present or any succeeding administration, the more likely was it to be in accordance with their principles and objects as sanitary reformers.

Mr. Ernest Hart read a paper on 'County Boards,' and their functions and opportunities with regard to sanitary administration; which is published at page 443.

The discussion of these subjects and the questions involved was carried on by Dr. Bond, Dr. Robinson, Mr. Gould, Dr. Alcock, Professor Way, Dr. Owen, and others, after which the following resolution was drawn up by the Chairman, and seconded by Professor Way, embodying the suggestions arising from the discussion:—

'This Conference confirms the resolution passed by the Conference of 1878, in favour of the institution of County Boards to conduct the ordinary administration and financial business of the county. This Conference is further of opinion that representative County Boards should be instituted with the least possible delay, and that the functions entrusted to them, and the powers conferred upon them

should be wide and full, and conceived in the view of enlarging, elevating, and reinvigorating the principle of local self-government in this country; and, further, it is the opinion of this Conference, that such County Boards, or combinations of them, in preference to newly constituted authorities, should be charged with the conservancy of rivers, including the prevention of floods, the storage of water, and the preservation of rivers from pullution; and, lastly, that such County Boards should also be charged with the appointment of County Health Superintendents in each county.'

The Conference was continued on Friday. The first subject discussed was Local Government Board inspection. After a discussion, in which Mr. Chadwick said the Local Government Board was a sham, the following resolution was adopted:—

'That in the opinion of this Conference the question whether the administrative organisation of the Local Government Board can be strengthened and improved by mapping out England and Wales into a few large areas, each area to be under the administration of a staff of inspectors, the whole under the superintendence of a permanent head of the department, properly assisted and relieved of secretarial work, is one deserving the attention of Her Majesty's Government; and that this Conference is of opinion that it is desirable there should be instituted without delay, in connection with the Local Government Board, an inquiry department for the assistance of local authorities wanting information, and applying for it, charged with the investigation of scientific processes, the collection of statistical data, the official record of sanitary experiments here and in foreign countries, and the publication of periodical reports upon the results obtained, and that the Council of the Society of Arts be requested to bring the question under the consideration of the Government, and urge its speedy adoption.

The next subject considered was 'Amendment of the Law,' it being introduced by Mr. Cresswell, Q.C. The following resolution was moved by the Chairman, and carried *nem con.*:

'That in the opinion of this Conference the Public Health Act of 1875 requires revision and amendment in many important particulars, and that this suggested amendment and additional clauses subjoined deserves the attentive consideration of Parliament.'

'PUBLIC HEALTH ACT, 1874.— *b.* By conferring powers, and corresponding duties, upon local authorities with regard to the construction of sewers, and connection of house drains therewith, not less extensive than those conferred upon the Commissioners of Sewers by the 11 and 12 Vic., c. 112, ss. 37, 38, and 46. By amending section 23, and substituting one hundred *yards* for one hundred *feet*, and empowering the sanitary authority to prevent the continuance in old, and the construction in new, houses, of any drain, sewer, or conduit within the building until an outfall for emptying the same has been provided and constructed to the satisfaction of the authority, other than into any lake, pond, river, canal, or watercourse. *d.* By enabling local authorities in rural districts to construct new sewers and water-supply works for the special service of outlying dwellings, and necessary for their healthful occupation, and charging the cost of the same upon the owners or occupiers thereof, payment to be made within a period not exceeding twenty-one years, the intent of such provision being that rates for sanitary purposes in rural districts, including water-supply, should, as far as practicable, fall on those only who are benefited by the improvements.'

It was further resolved that it is desirable that amendments should be made in the Rivers Pollution Prevention Act, 1876, 39 and 40 Vic., c. 75. *a.* By striking out of sections 2 and 3 the word 'knowingly', as superfluous and embarrassing. *b.* By striking out of sections 3 and 4, the words 'solid' and 'liquid' respectively, and by substituting, whenever necessary, the word 'matter'.

In the course of a discussion, Mr. Owen (Exeter) said the Adulteration Act was practically a dead letter, more especially as regarded milk adulteration, owing to the difficulty and cost of carrying it out.

On the motion of Mr. Cresswell, Q.C., seconded by Dr. Wright (Cheltenham), the following resolution was adopted:—

'That it is expedient that the local authorities should be empowered by the legislature to make provision for inspection of dwellings on a defined system upon application being made by the owners thereof, and to grant certificates according to the perfection of sanitary equipment and fitness for habitation of such dwellings, accompanied by plans of the drains, gulleys, etc., and to determine the scale of fees to be paid for such inspection during construction and repair or otherwise, and also upon delivery to the applicant of the certificate awarded to such dwelling.'

It was stated that the conditions and mode of granting these certificates would be analogous to the practice of 'Lloyd's' Association in granting certificates to vessels.

After passing a resolution that the Society of Arts be requested to call the Conference together again when deemed advisable, and especially on the introduction of a good measure relating to local government, the business of the present meeting was brought to a conclusion.

MEETING OF THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

THE last ordinary meeting of this Society for the present session was held on May 21st, Dr. Bristowe, President, in the Chair. After the minutes of the last meeting were confirmed, a report of the Council was read on 'The Advisability of the Summaries of the next Census being published at an earlier period than has been customary', stating that they agreed with Mr. Edwin Chadwick, C.B., that these summaries should be more quickly published than hitherto, but they considered it would be better that the matter be referred back to them for a full report on the subject at the first ordinary meeting of next session. Carried. Also, 'As regards the Establishment of a Library on Sanitary Subjects', they advised that this reference should stand over, as there are certain difficulties in the way which the Council deem insurmountable at present. Carried. Dr. Saunders, Medical Officer for Middlesex and Herts, made some remarks concerning the census for consideration of Council, especially as to the possibility of certain centres of population being returned as well as parishes, and of the medical officer of health for a district being associated with the superintendent registrar. A letter was read from Dr. Billings of Washington, asking how he could obtain copies of the published reports of the Society of Medical

Officers of Health. Proposed and carried, that copies of the reports of the Society be sent to Dr. Billings and the Surgeon-General's Library at Washington. Dr. Acland, the Regius Professor of Medicine at Oxford, stated his desire to have copies and any other information on sanitary matters which might be useful for his Address on Public Health to be delivered at the annual meeting of the British Medical Association. Some conversation took place respecting the annual meeting of the Society in July, when it was resolved that the Council decide on the place for holding the meeting.

Dr. Collie then read his paper on 'Some Public Health points in the Management of a Small-Pox Hospital'. He began by stating that he did not refer to the merits or demerits of any particular hospital, and that a great deal depends on comparatively simple things which are often forgotten. That small-pox is practically the most infectious of all diseases, so that precautions which are sufficient for fever and scarlatina are not enough for it, especially as it strikes at once, and attacks not only those in immediate contiguity to the patient, but even in other wards, so that it is not safe to treat patients suffering from this disease in the same building with others. Infected clothing readily spreads the disease, so that the laundry arrangements must be separate. The great fatality of the disease must also be taken into consideration, and demands greater precautions, especially as the sequelæ are often permanent, such as blindness, deafness, and great disfigurement of the face. He then went on to state: 'The first and most important question is that of site, not in relation to soil, but in relation to patients; and I venture to lay it down as a self-evident proposition that a small-pox hospital ought to be where the patients are likely to be found.' He thinks that 'to bring a healthy and uninfected neighbourhood into daily and hourly contact by means of the infected sick—by means of visitors who travel by road and rail—seems to be wholly unjustifiable except on the plea of necessity.' He said, 'I should establish my hospital where the disease is likely to be most frequent and most severe—that is, in the crowded parts of large towns; and I should prefer small hospitals to meet the needs of local outbreaks to large ones at a distance from the homes of the sick. To what extent this may in particular instances be practicable, it is no part of my purpose to inquire. What I wish to point out is the ideal which in all circumstances we should aim at, and that ideal, as regards site, is the isolation of the disease on the spot, or as near thereto as may be practicable.' He pointed out the danger to the patient likely to arise from his being removed to a hospital at a distance from home, and to possible objections, either on the part of the patient or his relatives, to his being removed at all, because of expense incurred in going to visit him or inquire after his condition. He thinks that it is at the beginning of epidemics, when cases are mild, that local hospitals would be found most beneficial, and states that it is advisable that these mild cases should be promptly isolated, and that no opportunity should be given to allow the patient's friends to assert that he is not bad enough to be sent from home. He thinks, moreover, that danger may be increased by having to remove a patient to a distance—a danger arising from the possible introduction of the disease into intervening districts, either from the ambulance, the patient, or his friends. He also suggests the advisability of utilising the spaces created by the destruction of 'fever dens' as sites for local small-pox or isolation hospitals, because they have previously been the scene of the disease, and since it is unlikely that the hospitals, when properly managed, should cause offence in such neighbourhoods. They (small hospitals) had this great advantage, that persons were often removed to an adjacent hospital who would not be sent to a distance from their husbands, wives, or children, as the case might be; and, also, that the patients suffered less in transit. Mild cases are often kept at home and spread infection because of the distance to which they must be removed. Dr. Collie then gave several instances of the spread of disease by dressmakers and others who were attending upon sick persons in their homes. He discussed the question of infection by letters, and said there is at present no evidence to show that the disease is ever spread by their agency, especially as they are generally disinfected before they are posted from hospitals. He next considered 'how the hospital should be constructed', and said that it should be surrounded by high walls, if possible at a distance from dwellings, and so arranged that there should not be any free communication between the inmates and persons outside. That nurses and servants should not be able to leave the grounds except by the lodge gate, or boys be able to get over the walls after caps, etc. He thought that if ninety feet, or even a shorter distance intervened between the buildings and the walls no infection could be carried outside, as there was no instance of infection in the infirmary of the City of London Union, which was ninety-five feet away. He objected to anything but the hospitals being within the walls, so that tradespeople and visitors going to the medical officers' houses and the steward's department need not enter the grounds; also, that the entrance to the hospital should be enclosed so as to allow the ambulances to enter at once. He gave two instances of persons being infected by neglect of these arrangements. The admission of patients he considered should be unrestricted, and that no formalities be legally necessary as at present, when much time is lost by the patient's friends having to apply for an order and then wait for the Poor-Law Medical Officer's certificate. This loss of time and trouble are caused by objections raised by Poor-law officials, although all sanitarians have agreed that they are objectionable. He also insisted on the necessity for quarantine-wards, where patients could be placed whose disease was doubtful, as no less than 50 out of each 1,000 admissions under his care were of persons suffering from other diseases. As to ambulances, he advocated their being made of hard wood, and capable of being scrubbed out after each time of using. He did not believe that the disease was spread from them whilst in motion, but that this might readily occur if the ambulance drivers stopped on the way to or from the hospital. The drivers should be in uniform, and all the contents removed whilst in the hospital grounds; then be disinfected and washed. As to the discharge of patients, it is necessary that they be retained until all the scabs have come off and scales ceased to form, which may occupy even three or four months. The usual time in the asylums' hospitals is two months, and regular baths are taken before the patients leave. All the waste products, poultices, rags, etc., should be burnt, and the coffins containing the dead filled up with charcoal. No dogs should be admitted, as they are liable to take the disease. He then went on to speak of the last, possibly the most important, question of all, viz., that of the visiting of patients. This question is one of great importance, and we therefore, as nearly as possible quote Dr. Collie's own words on the subject.

'Visitation ought to be confined to the nearest friends, and in special circumstances, when these come from the country, they should be warned of the risk they run, and be advised what precautions they should take in the event of their becoming infected. Beyond this I would not go; but I think that, in no circumstance, ought the husband to be prevented from seeing his wife, or the wife her husband, or either from seeing their children. They may sometimes risk their lives, but this is often a duty.'

He stated, in conclusion, that with efficient vaccination, and re-vaccination at a suitable age, persons might live with safety, not only near, but inside a small-pox hospital, and added that it is to vaccination that we must look for protection from small-pox.

MEETING OF MEDICAL OFFICERS OF HEALTH IN LEEDS.

A combined meeting of the North-Western, Northern Counties, and Yorkshire Associations of Medical Officers of Health was held, on May 7th, in Leeds.

Mr. Vacher read a paper on 'Health Economy', which is published at page 454.

In the discussion which followed the reading of this paper, Dr. Yeld, of Sunderland, referring to the agitation against the Contagious Diseases Acts, said many of the ladies taking part in it were persons of refinement, but knew little of the state of things which prevailed in the towns in which those Acts were in force. Judging from the reports of the medical men concerned in the carrying out of the Contagious Diseases Acts, he was of opinion that they had had a very great effect in preventing the terrible evils they were designed to combat. Mr. Rayner, of Stockport, expressed the belief that the modern feeding bottle was the cause of a great deal of the excessive mortality from diarrhœa amongst young children, and that a return to the old-fashioned bottle or to the spoon in feeding infants was much to be desired. He had sometimes taken the feeding bottle from the mother whose child was suffering, and asked her if she would take the milk it contained. She would reply that she would not, and yet she gave it to the child. Mr. Holden, of Hull, concurred in that opinion. Pure milk, properly diluted to the standard of the mother's milk, was the proper food for infants, and was not to blame for infantile diarrhœa. It was the improper mixing of milk with starchy matter, which the stomachs of infants would not assimilate, and the improper feeding bottle, which were the great factors of that affliction. Mr. S. W. North, the President, said a very large amount of disease was undoubtedly due to depraved habits, to ill-ventilated dwellings, squalid localities, and to damp and undrained soil, and when these causes had been removed, considerable progress would have been made in the work of protecting the public health.

Dr. Hime, of Sheffield, read a paper on Whooping-Cough and Measles, in which he called attention to the prevalence of whooping-cough among young children in Sheffield and elsewhere, pointing out the seriousness in this connection of those clauses of the Elementary Education Act, which necessitates the attendance at school of all children between the ages of five and thirteen years. Dangers to public health were caused by the return to school of children not sufficiently recovered from infectious diseases, and it was desirable that the School Board should have power to appoint medical inspectors. The cost of such inspection would be very small, and its advantages were obvious. In all England there had been 296,528 deaths from whooping-cough during the last twenty-eight years. The theory had hitherto existed that there was a causal connection between whooping-cough and measles, but statistics drawn from England during the last twenty-five years, and from Sheffield for nineteen years, showed that this was an error, there being an equal probability the other way. His own experience in Sheffield confirmed him in the opinion that whooping-cough was not especially a disease of cold weather, as had been commonly supposed. In Sheffield, as had generally been found to be the case, more females than males died of whooping-cough, whilst contrary to the usual experience, the first year of life was not one that yielded most victims. Nor had he found that the spread of this very contagious disease was the greatest or most fatal in the poorest and most densely populated districts. Dr. Britton, of Halifax, said, that from the tables Dr. Hime had prepared, he found that for eight years there had been practically no cessation of either one or other disease. Did not that rather point to the view that the same causes might produce the two diseases? He never found measles about without finding whooping-cough, and he never found whooping-cough prevailing without finding measles; and he had come to the conclusion that the same causes produced the two diseases. Mr. Rayner thought that measles and whooping-cough were very nearly related to one another. When they had two epidemics prevailing concurrently, he considered they had good ground for assuming that they were more or less united. Dr. Drew, of Sheffield, said, the fact of the mortality being alike for the two diseases at the same time was due, he thought, not so much to one cause producing the two diseases as to the cold weather affecting children who were suffering from one or other of the diseases. The President could never understand what argument there could be that measles and whooping-cough had anything in common, for it was not enough to say that they were sometimes found together within a certain area. Dr. Hime further remarked that it was of the greatest importance that Medical Officers of Health should receive prompt information of the outbreak of zymotic diseases amongst the children in elementary schools, and he hoped some such arrangement might speedily be made in all towns. Mr. Holden was happy to say that in Hull the School Board co-operated cordially with him in that respect.

The President read the following letter, from Dr. H. F. Parsons, Inspector under the Local Government Board:—

Dear Mr. North,—A few days ago I had a conversation with Mr. Humphreys, of the Revenue Register Office, about the inconveniences which Medical Officers of Health experience in the preparation of accurate vital statistics for their districts, especially in cases in which the sanitary districts do not coincide, as they rarely do, with the divisions adopted for registration purposes. I made one or two suggestions which I thought would in part obviate the difficulty, and he replied that they had been thought of, and that the Registrar-General had no objection to them, but that they were not demanded by Medical Officers of Health and the public. I have, therefore, thought that it might be as well to call the attention of the three associations of Medical Officers of Health to these points (unofficially of course).

1st. It would be very advisable that in the census returns for 1881 the number of inhabitants living, at the several ages, should be given for every sanitary district. In the returns for 1871 this information is only given for the registration districts (unions) and sub-districts, which rarely coincide with the districts for sanitary purposes. I need hardly say that the normal death-rate in a given population will vary greatly according to the average age of the persons comprising it. In one in which there are many old persons the death-rate would *cæteris paribus*, be higher than in one in which young people predominate. For want of attention to this point the death-rate in many rapidly-growing towns, where the birth-rate is high, and into which many young adults immigrate, appears more favourable than it should in comparison with country districts in which the old people remain behind, while the younger ones emigrate into the towns. As the bill for the census of 1881 will have to be passed this session, it is very desirable that some pressure should be used to get this information in-

cluded in the tables. The only objection, I am told, is the expense. The other points I have to mention concern the registration of births and deaths.

2nd. It is very desirable that in registering a death in any public institution, *e.g.*, a hospital, workhouse, or asylum, which receives inmates from more than one place, the place from which the deceased was brought should be entered in the register and in the return of deaths presented by the Medical Officer of Health. The inclusion of the deaths of persons brought for treatment into a hospital, workhouse, infirmary, or asylum among the deaths properly belonging to the district in which such institution may be situated gives rise to a double fallacy. It raises unfairly the death-rate of that district, and it lowers that of the districts from whence the patients were brought. Thus, in a district which I have lately inspected, Edmonton, there are two large workhouses, the inmates of one of which are wholly, and those of the other in great part, recruited from other districts. More than a third of the whole deaths in the district were those of persons belonging to other parishes brought into these workhouses. In the case too, of visitors the place of residence should be entered. This is especially important in health resorts, the apparent mortality in which is widely raised by the deaths of visitors, who come there for the sake of their health, but unsuccessfully. Medical Officers of Health, who are appointed under the Local Government Board's order, must often have experienced, like myself, much difficulty in filling up the fourth and fifth columns of the official table B, 'Deaths of persons who have come into the district with their fatal illness upon them.' At present such information can only be got by the courtesy of the managers of public institutions, or, in the case of visitors, by personal inquiry in every case. In some districts the former place of residence of deceased visitors and inmates of institutions is already entered by the registrars, and the practice might easily be made universal.

3rd. It frequently happens that an urban sanitary district comprises only part of a parish. In such cases it is difficult, and without intimate local knowledge impossible, to say whether a given birth or death has occurred in the rural or the urban part of the parish. It would be easy for the registrar, possessing as he does this local knowledge, to add 'rural' or 'urban', as the case may be, after the name of the parish in which the birth or death occurred. This is done in some cases. It was so at Goole, on my representation, and I have experienced much difficulty from its not being done in other cases.

4th. It would be advantageous if the number of deaths from zymotic diseases and other principal causes could be given in the Registrar-General's annual reports for areas smaller than registration districts. In the quarterly returns the number of deaths from zymotic diseases is given for each sub-district, but the deaths are classified for this purpose by the local registrars, not at the General Register Office; hence the classification is often very inaccurate, *e.g.*, scarlet fever and rheumatic fever being returned under 'fever'. I believe that the numbers are tabulated for each sub-district in the General Register Office, and the question is only one of the extra expense of printing.

I shall be much obliged if you would kindly submit these remarks for the consideration of the meeting, and, if you think proper, move any resolution thereon.

In the course of the conversation which followed the reading of the letter, Dr. Goldie stated that, in view of the coming census, he had adopted a plan by which, with the help of the registration officials, he could represent on a survey map of Leeds the deaths that had taken place from different diseases in the various districts, and thus obtain a record which would be of great value.

A resolution was adopted to the effect that the letter of Dr. Parsons be referred to Mr. Vacher, with the request that he would embody the suggestions contained therein in the form of a resolution, and support it by such arguments as he deems necessary, the whole to be referred for approval to the president of the Northern Counties' Association and the president of the Yorkshire Association, and the conclusions arrived at to be afterwards forwarded to the proper authorities.

The President proposed a vote of thanks to Dr. Collie for his admirable paper, and several members expressed a hope that it would be soon published *in extenso*. Dr. Tripe said that he concurred with the suggestions contained in Dr. Collie's admirable paper. He had known infection to be brought from the hospital by two persons who were sent by an error of diagnosis and admitted without having the disease, and were sent home again after a short residence in the hospital. Neither of these took the small-pox, but they communicated it to persons in the houses where they lived. In another case, infection was conveyed to a child by the gift of a book and a cake sent by a convalescent small-pox patient. At first he was doubtful if the hospital were a centre of infection in his district, but the experience of the present outbreak made him almost certain that it is. There were certain arrangements which he thought caused this, and he had communicated with the managers on the subject. He agreed with Dr. Collie that small-pox infection is not carried by the air so great a distance as ninety feet, and, probably not fifty feet; and, also, that a small-pox hospital properly conducted ought not to be injurious. Dr. Gibbon thought that the large Asylums' Board's hospitals had proved injurious, as, during the last nine years there had been a greater mortality from this disease than at any corresponding period since 1840. Dr. Shea said that in his district he had the option of two sites, and chose the one which was outside the town, which he now considered to be a mistake. Dr. McCombie of the Deptford Small-Pox Hospital, said that many of Dr. Collie's views had been carried out there, and he was satisfied that infection was not transmitted by the air at so great a distance as ninety feet. Dr. Dudfield said that a dispute had arisen as regards Fulham Hospital, some stating that it acted as centre of infection and others not. He agreed with the latter, as, after close inquiry, he could not find out any cases which were traceable to infection from the hospital. The President, on the other hand, thought there was some condemnatory evidence as regards Deptford. Dr. Collie then replied, and the meeting adjourned.

THE PARKES MUSEUM OF HYGIENE.

WE are glad to learn that the demonstrations which were commenced at the Parkes Museum in January last have been very successful. The last was upon 'House Drainage', on March 13th, when Mr. Rogers Field addressed an audience of members of the Institution of Foremen Builders and Clerks of Works. Previous to the lecture, it was announced that the Executive Committee were prepared to arrange for further free lectures to working men and others interested in Sanitary matters. Institutions or Societies wishing to avail themselves of this offer, should communicate with the Curator, Mr. Mark H. Judge, at the Museum, University College.

Mr. Rogers Field said that he should first explain a few of the most important principles which must be attended to in all good house drainage, and would point out the various drainage appliances exhibited in the museum. The first object of a perfect system of house drainage should be the immediate removal of all foul matter directly it was produced. To effect this the drains must be of impervious material, and well and uniformly laid with a good fall. The best material was glazed stoneware, and in some cases iron-stoneware pipes should be jointed with cement, not with clay. Clay joints were a great source of danger, especially when the drains were near or under houses. Everyone knows that cesspools must be avoided; but, unfortunately, there were a number of traps partaking of the nature of cesspools, which were very largely used. The Lecturer illustrated this by an experiment with a working model of a so-called 'D trap', with glass sides, when it was seen that solid matter would not pass through the trap, but was retained in it. He said that the trap was a great favourite with the plumbers, and that he should think three out of every four water-closets in London were fitted with it, but that it could not be too strongly condemned, as being in reality a small cesspool. Experiments were also shown with a siphon trap, with glass sides, which did not retain the solid matters. A so-called 'pan-closet' was also shown,

which was very largely used; and it was explained how it retained foul matter. This kind of water-closet was, moreover, generally used with D traps, which made matters still worse. The second object of perfect drainage should be the prevention of any back current of foul air into the house. The usual means relied on are water-traps, but these, of themselves, are insufficient, as they allow foul gases to pass through them, even when there is no pressure, the gases being gradually absorbed on one side of the trapping water, and given off on the other. A familiar instance of this is the smell from many scullery sinks late at night, or in the early morning, after the house has been shut up. Various mechanical expedients have been suggested for supplanting traps, but the only reliable means to prevent the ingress of sewage gas into houses are thorough ventilation and disconnection. Efficient ventilation implies more than is generally supposed. It is not sufficient to afford relief of undue pressure, but a continuous current of fresh air must be created through the drains and pipes, to effect which two openings are necessary. This was illustrated by an experiment with smoke in a glass tube, when there was only one opening, the smoke would not escape from the tube; but when there were two openings it did. The most efficient means of all of preventing the ingress of sewer gas was 'disconnection', or cutting off the direct communication between the sewer and the house drains. The Lecturer then explained, by means of large diagrams, the essential difference between direct communication and disconnection, and showed that when the house drains are in direct communication with the sewer, the air of the sewers is, as it were, laid on to houses; whereas, when efficient disconnection is used, the sewer air is 'cut off'. Nothing can be worse than connecting the waste pipes of sinks, baths, and overflow pipes of cisterns directly with soil-pipes and drains, as is so often done. Mr. Rogers Field then proceeded to explain the various drainage appliances exhibited in the museum. He pointed out Stanford's patent joints, for stoneware pipes (made by Doulton), which enabled perfectly watertight joints to be readily made. He explained the self-acting flush tank, invented by himself, and also made by Doulton, and showed it in action. The tank is for collecting the water from sinks, baths, etc. No discharge takes place till the tank is full, when the accumulated supply is discharged with a sudden flush, by means of a self-acting siphon. The various traps, gullies, etc., were then examined, and Hellyer's Drain Interceptor, Buchan's Patent Trap, Mansergh's External Drain Trap, Dean's Patent Trap, a gully of Doulton's, were pointed out, amongst others, as good traps for open air disconnection of waste pipes. There were also several special ventilator traps for the disconnection of soil-pipes, and among these Pott's Edinburgh traps, made by Cliff, Hellyer's Sewer Interceptor, Buchan's Patent Trap, Weaver's trap, were pointed out as useful. The water-closets were then examined, and their particulars pointed out, and also the various sinks, lavatories, baths, and other appliances. The remarkable collection of specimens of defective plumbing were then examined; and the Lecturer stated that Mr. W. Eassie, C.E., who had traced out and presented a large number of those specimens to the museum, had informed him that nearly all of them were connected with cases of disease or death. Amongst them the disgusting D traps, previously alluded to, figured pre-eminent, generally with the waste pipes of baths, or overflows of cisterns, discharging into them.

THE MICHIGAN SANITARY CONVENTION.

THE second of the State Sanitary Conventions which Michigan has the honour of having instituted, was held on the 17th and 18th of February. The attendance and amount of work done were very creditable. Among the papers read and meriting special attention, were those by Dr. H. B. Baker of Lansing, on 'General Sanitation'; by Dr. E. H. Van Deusen, of Kalamazoo, on the 'Relation of Drainage to Health'; by Mrs. Ballard, of Grand Rapids, on 'Cooking'; and by R. C. Kedzie, of Lansing, on 'Some Conditions of Inflammability'. A number of sanitary appliances were exhibited. Dr. A. Hazlewood was Secretary of the Convention, and to his efforts the success of the meeting was largely due.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

ASTON RURAL.—There is evidently much to be done in this district with respect to the drainage and water-supply of the populous villages that compose it. Dr. Hickinbotham seems to have the matter well in hand, and to be seconded, though at a distance, by his Authority. An organised system of scavenging under the control of the Authority would seem to be much wanted for certain of the villages. The number of deaths registered during the year was 356, against 361 in 1878, or 15.01 per 1,000. Twenty of these deaths were from zymotic diseases, of which 13 were produced by scarlatina, 3 by whooping-cough, and 1 by typhoid fever. Ninety-six deaths occurred in children under five years of age, 30 of these being in one parish of 5,000 people.

BISLEY.—'Some very old nuisances' in this district 'have been done away with at last. The long existing pig nuisance at France Lynch is much improved', and generally there seems to be a sanitary awakening in this district. Mr. Partridge records an epidemic of measles in the beginning of the year, and an outbreak of scarlet fever, which seems to have been checked by the closing of the schools. The general death-rate was very high (22.9 per 1,000), and deserved some special comment.

BOOTLE.—The infantile mortality of this district is still enormous, 49.3 per cent. of the total deaths being those of children under five years. Even this is lower than the percentage in 1878, which was 55.5 per cent. We should have liked to have seen this subject treated more at length in Mr. Sprakeling's report, since it is manifest that there must be something abnormal in a town where so terrible a mortality amongst infants prevails. The general death-rate (18.43 per 1,000) was not excessive, and was a great improvement on the rate for 1878 (22.32 per 1,000). The number of deaths from zymotic disease was 100, or 82 less than in 1878, and comprised 21.2 per cent. of the total deaths. All the diseases present a favourable comparison with 1878, except scarlatina and croup, which were more fatal than in the previous year. During the year, the continued prevalence of scarlatina occasioned the Authority considerable anxiety, and strenuous efforts are asserted to have been made to check the progress of the disease. Whether these efforts included isolation in hospital is not stated. The important question of the emptying of ashpits seems to be receiving attention by the Town Council.

CHELTENHAM.—In calculating the death-rate of his district for 1879, Dr. Wright has excluded certain deaths which occurred in 1878, but were not registered till 1879. It is not clear, however, whether he has made a corresponding addition of the deaths occurring in 1879, but not registered till 1880; if not, his calculated death-rate of 15.55 per 1,000 is open to a little correction. The total number of deaths registered during the year was 746. Three deaths occurred from typhoid fever, and three from diarrhœa. With these exceptions, zymotic diseases appear to have been almost absent, but we should have been glad to have seen some observations on the diseases of the year included in the report. There seems a good deal of work for the Sanitary Authority to accomplish. Numerous complaints of the well water in outlying parts of the town have been made, some of the common lodging-houses are old and dilapidated, pigs appear to be rife in the middle of the town, and the drainage of even first-class houses is defective, many of the licensed slaughter-houses are unsuitable and badly constructed, and much bad cottage property still exists.

DEVONPORT.—The greater part of this report is taken up with a discussion of the circumstances under which measles was so terribly fatal in the town during last year. It appears that the disease was introduced by the family of a soldier from a troop ship, and that it spread slowly amongst the children in barracks, notwithstanding all efforts of isolation and disinfection. When the regiment left, the quarters were kept empty and disinfected, and some families of the fresh incoming regiment were quartered for a while in the town, where by this time measles had spread from the families of the first regiment. When the barracks were reoccupied, the second regiment took the disease in with them. It soon spread rapidly, and thus went on gradually till it became generally diffused. Mr. May says that all parts of the town suffered alike, and he thinks there must have been 'some generally depressing influence at work in the whole neighbourhood'. It would be a matter of the highest importance to ascertain what this influence is. Not only Devonport, but Plymouth and East Stonehouse, which are virtually the same town with it, and other Devonshire places, have suffered of late very terribly from the disease, and there must be some reason for this. The matter is one that might well be investigated by a medical inspector from Whitehall. The 125 deaths from measles at Devonport naturally raised the mortality considerably. The general death-rate was in fact 21.8 per 1,000, as against a mean of 20.18 for four years. The cold and damp doubtless contributed to the mortality from measles, and also affected very unfavourably the issue of diseases of the respiratory organs. Bronchitis, etc., caused no less than 226 deaths, and phthisis 99. Considering its size and importance, there appears to be an undue amount of sanitary arrears at Devonport. Mr. May speaks of the non-ventilation of the sewers, and of the want of a mortuary, and is especially earnest in his advocacy of improved workmen's dwellings. An attempt in this direction seems, indeed, to have been made in the district, but in so bungling a fashion as to be of no real good.

HASTINGS.—Mr. Ashenden makes full reports to his Authority every quarter, and thus his annual report comes to be limited to a bare statement of facts. But it would have been interesting to learn, as far as possible, the circumstances under which the various zymotic diseases were present in the town during the year. A total of 34 deaths occurred from these causes; 9 being from scarlet fever, 4 from diphtheria, 7 from whooping-cough, 5 from fever, and 7 from diarrhœa. Of the 668 deaths, 157 were from constitutional diseases, and 114 those of visitors. The infant mortality was lower last year, the number of children dying under the age of five years being 188, against 227 in 1878. During the year, 28 persons was removed to the Sanatorium, and the disinfecting apparatus was largely made use of. The general death-rate was 16.84, against 16.79 in 1878, and 15.5 in 1877.

KESWICK.—The total number of deaths in this district was 59 as against 51 in 1878, the death-rate being thus increased from 14.3 to 16.1 per 1,000. The death-rate of infants under one year of age continues to decrease, but that of children under five years is considerably in excess of preceding years. The increased mortality amongst the latter is ascribed to diseases of the respiratory organs and of the brain and nervous system; and Dr. Ward adduces evidence to prove his theory that these diseases, at least in children, are not the result of low temperature, but are rather associated, more or less, with defective sanitary conditions. The Authority has evidently much more to do before the district can be regarded as in a satisfactory state. The water works have been bought and will be enlarged, the drainage of the district has been extended, but the back courts of the town are stated to 'vie with the condemned slums of our large towns, and are the nurseries of diseases associated with overcrowding', the slaughter-houses are defective and offensive, the scavenging is improperly performed, and the sanitary arrangements of many of the houses need energetic action on the part of the Authority.

KING'S NORTON RURAL.—Satisfactory sanitary progress is being made in this district. A hospital for infectious diseases, an improvement in the system of removal of excreta, and a more general use of the water service of the Birmingham Corporation, are, however, desiderata. Mr. Hollinshead calculates the death-rate, according to a census of his own, at 17.54 per 1,000 against 16.61 in 1878, and 15.06 in 1877. The number of deaths from zymotic diseases was 36, against 38 in 1878. There was an increase in the fatality of scarlet fever, which was prevalent throughout the district, and a considerable decrease in that of diarrhœa, due to the uniformly low temperature. Whooping-cough was rather prevalent, but was scattered all over the district, and did not assume an epidemic form. Out of a total of 303 deaths, 100 were those of children under five years, a proportion which Mr. Hollinshead properly describes as larger than it ought to be. He thinks that many of these deaths are due to the gross ignorance and carelessness of the poorer classes, and suggests the education of mothers in the management of their offspring, and the establishment of day nurseries. In this suggestion we quite agree.

EAST DEREHAM.—Mr. Vincent is able to record a considerable improvement in the mortality of this new district during 1879, the respective death-rates for 1878 and 1879 being 20.02 and 18.7 per 1,000. The chief part of this improvement seems to have been in the infantile mortality. Six deaths occurred from zymotic disease. In the early part of the year, several cases of scarlet fever broke out, and three died. During the later months, a severe epidemic of measles occurred, but only one death took place. The scavenging of the district has now very properly been undertaken by the Authority, with the result of

getting rid of large accumulations of night soil and refuse, and a promise of a reform in the system of excrement disposal.

LUTON.--The general death-rate of this place was not excessive (18.7 per 1,000), but the mortality amongst infants was enormously high. Of the 443 deaths, 124 were of infants under one year of age, and Mr. Sworder is afraid that this high proportion will continue, however much the sanitary condition of the town may improve, so long as the children are neglected and badly fed. He says that the mothers have, in many cases, very little knowledge of household duties, no idea of cookery, no idea of making a home comfortable, or of keeping it clean. The children are sadly neglected, while the mother spends all her time in earning a scanty pittance by very hard and badly paid work; and even when much money is temporarily made, little is saved for the hard times that come so frequently. The high death-rate from diseases of the respiratory organs (5.2 per 1,000) he regards as due chiefly to the sedentary occupation of the people, and also, to some extent, to the low-lying situation of the borough, the relaxing air, irregular meals, and badly cooked food. Fevers seem to have been unduly prevalent, and diphtheria and croup caused the large number of twenty-two deaths.

PETERBOROUGH.—This city appears at length to be in a fair way towards securing that sanitary improvement of which it stands so much in need. We glean from Dr. Thomson's report, that a water scheme has been successfully carried out, and that the Corporation are now giving due attention to sanitary matters. An index of improvement is the marked diminution of the fatality of typhoid, which caused 30 deaths in 1878, and 6 in 1879. Most of the zymotic diseases were present in the city during the year, scarlatina causing 38 deaths; diphtheria, 5 (each death being associated with defective sanitary arrangements); measles, 5; and whooping-cough, 10. Dr. Thomson's method of calculating the death-rate is not very scientific, and he might consult with advantage the article on p. 196 of vol. x of this journal. Considering, moreover, that the fatality of zymotic diseases is the feature of most sanitary importance in the mortality of a place, it is hardly right to state that, if we deduct the 77 deaths from 'preventable diseases, including diarrhœa as such, it will give the annual death-rate of 18.2 per 1,000 per annum'.

POOLE.—Last year was not a very favourable one for Poole; no less than three epidemics (whooping-cough, enteric fever, and measles) having occurred. Whooping-cough was prevalent during the first six months, enteric fever began to be epidemic towards the end of May, and measles was epidemic during the latter half of the year. This last epidemic was a very severe one; so severe, indeed, that there can have been but few families having children that escaped invasion. Mr. Lawton considers the two chief causes of its propagation to have been school attendance by children from infected houses, and the gossiping and gregarious habits of the mothers. The total number of deaths during the year was 238, being at the rate of 20.79, or 1.1 less than in 1878. Of these deaths, 101 were of children under five years, and 54 of infants under twelve months; a proportion which affords Mr. Lawton the opportunity of making some pithy observations on the iniquitous system of infant life assurance. The account given of sanitary work during the year is unusually full, and evidences energetic action by the Medical Officer of Health.

REDDITCH.—Mr. Page's report is, as usual, full and interesting, and reveals most painstaking and systematic work on the part of the health officer. Not content with a report on the sanitary doings and requirements of the district, Mr. Page has paid a special visit to three neighbouring towns, with a view of giving his Authority, who are now engaged in questions of drainage, the benefit of the experience of these places on the subject of sewerage and sewage disposal. The results of this investigation are appended to the annual report, of which they form a most valuable feature. Redditch is a place which has met with much attention in these columns, and it may, therefore, be sufficient to say that Mr. Page regards as the most urgent sanitary requirements of the district an efficient system of drainage, the provision of a hospital, and the abolition of the old midden cesspits. Not much sanitary work was actually effected during the year, but there seems now to be a promise of more. A great many cases of zymotic disease are reported, those known to Mr. Page numbering 444, against 510 in 1878, and 255 in 1877. Measles heads the list with 233 cases, and attained almost epidemic proportions. Curiously enough, only 6 of these cases were fatal. Of whooping-cough, 108 cases were recorded; of scarlet fever, 24; of diarrhœa, 72; and of fever, 7. The infantile mortality is still enormously large, no less than 54 per cent. of the total deaths being those of children under five years of age. Amongst children, especially, diseases of the respiratory organs were very fatal, and, on the causes of this mortality, Mr. Page has some unusually interesting observations. The general death-rate, as calculated on the local census taken last year, was 22.5 per 1,000; a rate which classes Redditch amongst the most unhealthy of provincial districts.

SALTLEY.—We are unable to share the satisfaction of Mr. Cresswell with the 'favourable returns' of this district, when nearly a seventh of the deaths are from zymotic diseases, and half the total mortality is amongst children under five years of age. Sanitary work appears, however, to be energetically carried out in the district. An 'admirable' system of sewerage has been devised, and the local board have undertaken the removal of the contents of ash-pits at frequent and regular intervals. In addition, all houses known to have contained infectious cases were carefully disinfected, and isolation, as far as possible, carried out. The general death-rate of the year was 17.84, as against 19.0 in 1878, and 18.9 in 1877.

TAMWORTH RURAL.—Dr. Fausset's report contains a good deal of information of a practical character with reference to the sanitary improvements and wants of the district, a feature which is too often neglected by medical officers of health. Dr. Fausset briefly sums up, with regard to each village, what has been done, and what remains to be done in it; and he gives subsequently, under different headings, the progress made generally with regard to such matters as drainage, water-supply, etc. A good deal of the cottage accommodation seems to be bad, dilapidated, and damp, and this has doubtless contributed to the undue fatality of diseases of the respiratory organs, which caused a third of the total deaths. The only zymotic disease that was prevalent to any large extent was measles, of which there was a severe epidemic, spreading rapidly over the district, and causing 9 deaths. In all, 40 deaths were due to zymotic causes, 26 being in children under five years of age. The general death-rate of the year was 17.4, or 1.0 less than that of 1878.

K K

WAKEFIELD RURAL.—This district has now come under the sanitary charge of Mr. F. H. Wood, the former officer, Mr. W. D. Wood, having taken up Dr. Child's combined district in Oxfordshire. The new medical officer seems to have become well acquainted with the district, and he reports a want of drainage and of better water-supply for several of the townships. In one place where there is a want of drainage, several cases of typhoid fever have lately happened, an occurrence which ought to expedite matters with the local Authority. The most serious zymotic disease of the year was scarlatina, which caused 31 deaths, and was widely diffused. Typhoid fever caused 13 deaths; whooping-cough, 16; and diarrhœa, 26 deaths. The mortality from phthisis (65 deaths), and from bronchitis, etc. (194 deaths), is enormously high, and should certainly have received consideration. The total number of deaths was 846, including 152 deaths in the West Riding Asylum. On an estimated population of 35,000, the death-rate of the district proper would, therefore, be 19.5 per 1,000.

WAREHAM RURAL.—Dr. Stainthorpe only commenced work as Medical Officer of Health in October last, but he has begun well, and shows an adequate appreciation of the importance of his duties, his remarks on the methods of spread of the various zymotic diseases being especially good. During 1879, there were 348 births and 199 deaths in the district; the latter being at the rate of 15.3 per 1,000. Thirty deaths were due to phthisis, and 39 to bronchitis and pneumonia, 1 to diphtheria, and 3 to typhoid fever. The death-rate from phthisis is especially high, and would be worthy of further study. There are many insanitary matters to which Dr. Stainthorpe has called attention, which deserve the earnest attention of the Authority.

WEARDALE RURAL.—Mr. Arnison's report on the Stanhope division of this district calls for no special remark. The health of the district is stated to be good, but a death-rate of 22 per 1,000 is recorded. Scarlatina seems to have reappeared three times, though, on each occasion, 'disinfectants were supplied by the inspector of nuisances'.

WORCESTER.—Sanitary work in this city appears to be in progress, but Dr. Strange complains that 'foul drains, offensive pigs, and miscellaneous nuisances, are continually arising, and require constant vigilance and searching out on the part of the inspector of nuisances and of the public at large'. The use of the city water is daily increasing, and wells and pumps are now almost universally disused. The main drains seem to have been in good order during the year, but the house drains evidently want looking to. Dr. Strange has some interesting remarks upon the subject of unwholesome meat, with regard to which a constant watch is kept in the city. The removal of a number of old and dilapidated houses in the courts and narrow streets should be a matter for the early consideration of the Authority. Dr. Strange records for the year a greatly diminished death-rate, less serious sickness amongst all classes, and an almost total absence of fevers and other epidemic diseases. The corrected number of deaths for the year was 741, of which 235 were in children under five years of age. In 1878, the total was 845, or 104 more; and the deaths under five years were 367, or 132 more. The death-rate was 21.17 per 1,000, the lowest rate yet reported. None of the zymotic diseases were very prevalent, but the severity of the early and latter months of the year proved fatal to an extraordinary number of very old people, most of whom died of bronchitis or other diseases of the lungs. As regards infantile mortality, Dr. Strange is able to report a great improvement; but the figures of the year corroborate in his view his theory that it is inaccurate to suppose that the proportion of deaths of infants under one year of age per 1,000 births is a true test of the sanitary condition of any town or neighbourhood. On this subject we have already commented (vol. x, p. 344), and we need not, therefore, go over the ground again.

SANITARY INSPECTOR'S REPORT.

Mr. W. H. Worrall, the Sanitary Inspector of Harborne, has presented his third annual report of sanitary work done during the year ended 31st March 1880, to the Board. It shows the following results: The number of nuisances dealt with during the above period was 163 as against 173 for the year ending March 1879. During the year Mr. Worrall has submitted fourteen samples of well water to the analyst for his examination, as against seventeen for the year 1879-80. Thirteen of these samples have been pronounced unfit for domestic use, and one was shown to be a good sample. The number of houses affected by the condemning of the above-mentioned wells was thirty, and represented a population of about 180. In all these cases the Birmingham Corporation Water has been laid on. The number of ashpits emptied during the year was 659, at a total cost (including carting) of £132 8s. 2d., as against 603, at a cost of £115 12s. for the preceding year. This shows an increase of fifty-six ashpits emptied over last year's number, and the cost has increased by £22 16s. 2d. The estimated cost of this work per head of the population is 5¼d. Mr. Worrall points out the necessity for a compulsory registration of zymotic diseases, since it sometimes happens that a case of scarlet fever or other epidemic disease exists in a house where the person having charge of the patient does not take proper steps for isolation and disinfection, and the sanitary Authority is not made aware of its existence.

LAW REPORTS.

COMMON PLEAS DIVISION.

(*Sittings at Nisi Prius, at Westminster, before* LORD COLERIDGE *and a Special Jury.*)

SANITARY CONDITION OF A DWELLING HOUSE.

KELSON *v.* QUEENSBERRY.—The claim was for rent due under an agreement for the lease of a house. The defendant pleaded the non-fulfilment of an implied condition that the house was in a habitable state. There was also a counter-claim for damages on account of the breach of this implied condition, and alleged misrepresentations by the plaintiff as to the sanitary arrangements.

The plaintiff was tenant from year to year of the house in question, which was situate at Marlow and called the Deanery, the superior landlord being Mr. Scott Murray. Part of the building was considered to date from the 14th century, and the system of drainage was by cesspools. One of these, under the house, had been filled up in 1877, and at the same time two feet of soil had been taken away and concrete substituted under the greater part of the ground floor. There was a water-closet in the house, with a drain running into a cesspool outside the house, and another drain from the scullery running into an open

cesspit into the yard, covered with a grating, which communicated by a pipe with a second cesspool. Such appeared to have been the state of the premises when on the 12th of May, 1879, the above-mentioned agreement was concluded between the plaintiff and defendant. The effect of the agreement was to let the premises furnished, 'in the condition that they are now in,' for one year, at a rent of £3 a week. The plaintiff covenanted to have any of the usual repairs that he could demand from the superior landlord executed forthwith. He also agreed to carry out to the best of his power all the propositions contained in a letter of the defendant written on the 1st of May, the most important of which were that the 'drains, pipes, etc., were to be kept in order', and that the defendant accepted the plaintiff's assurance that the drains were all right. After the execution of the agreement the defendant went down and took possession. According to her case, she immediately noticed a bad smell in several of the rooms. Complaints were made to the plaintiff, who came down a few days afterwards and offered to allow the defendant to cancel the agreement. Nothing, however, was settled, and the defendant continued to occupy the house till the 11th of August, when she left and did not return. The first quarter's rent had been paid in advance, but the defendant declined to pay the rent of the next quarter when it became due.

The plaintiff having put in the agreement, and occupation by the defendant being admitted,

Lord Coleridge intimated that he should rule that in the present case the express bargain to take the house in its then condition would override any implied contract that the law might infer as to a furnished house being fit for habitation. The case for the defence must therefore be confined to the breach of any specific promises made by the plaintiff. His Lordship allowed the counter claim to be amended in accordance with this ruling.

The defendant was then called, and gave evidence to the effect that she had taken the house on the assurance of the plaintiff and his wife that the sanitary arrangements were satisfactory. She noticed bad smells directly she went down to the place, and they continued during the whole time of her occupation, affecting her health and obliging her to keep the windows and doors perpetually open. There were three distinct smells in her bedroom. In the beginning of July she sent for the medical officer of health and the sanitary inspector. The cesspools were cleared out by the plaintiff's order, but the smells continued. Eventually she was obliged to leave. Several members of the defendant's family, servants who had lived in the house, the medical officer of the district, and two sanitary inspectors were called, and gave evidence as to the prevalence of bad smells in certain rooms. These smells were described as 'putrid', 'horrible', 'like a dead Indian' (that one of the witnesses had come across in Patagonia), 'death-like', and 'offensive'; but with the exception of the open cesspit near the scullery (which only affected the part of the house near it), the witnesses were unable to connect the smells with any particular cause. The witnesses living in the house described their health as affected by these odours, but it also appeared that the defendant had, as late as July, asked an old servant down to the house for the house for the benefit of her health, and that Lady F. Dixie, who spoke to the smells, had left her children in the house after her visit.

At the close of the defendant's case,

Lord Coleridge said that, taking the view he had already laid down, he did not see any evidence to go to the jury, except that the plaintiff did not do something which would have put in order the cesspit and its connexion with the cesspool.

As to this point rebutting evidence was offered by the plaintiff, who said himself that he had explained to the defendant the proper method of keeping this cesspit in order, and called the mason who had made the drain in question, who said that if properly attended to there would be no smell arising from it, but that he found on the 26th of May, when called in by the defendant, that the grating was choked.

Lord Coleridge, in his summing up, said that the law was that unless the thing delivered to a person under a contract was wholly different from what he had contracted for, if he took to it he must pay what he had promised. If he did so owing to misrepresentations the law allowed a person to recover damages. The main consideration was, had the plaintiff done what he ought to have done under the agreement of letting? His Lordship then described the state of the premises when the defendant entered and during her occupation, ending by leaving four questions to the jury:—1. Did the plaintiff carry out all the propositions that lay in his power contained in the letter of May 1? This question was answered in the affirmative. The other three questions, which asked whether there was any unfitness for habitation of the house, either general or occasioned by the scullery drain, or by any other drain, were answered in the negative.

Verdict and judgment for the plaintiff.

Dissemination of Infectious Diseases by Milk.

Andrew Davidson, a dairyman, was summoned before the magistrates at Newcastle-on-Tyne, charged with unlawfully using a milk stall in a way likely to cause contamination of the milk therein, by allowing a person suffering from a dangerous infectious disorder to remain in a room adjoining the milk stall on the 16th of April. It appeared from the evidence that there were only two rooms on the ground floor of the house, a kitchen and a front room. In the kitchen were a number of milk vessels containing milk: in the front room the defendant's son lay, suffering from enteric fever. The defendant was repeatedly warned that it was necessary to keep the milk vessels out of the house and to take the boy into an upper room, but he paid no attention to the inspector's request, or the order of the Medical Officer of Health who also visited the place. Davidson pleaded ignorance of the law on the subject, for although his dairy had been duly registered, he had not had any copy of the regulations sent to him, and he did not think that his son was really suffering from fever. Dr. Armstrong, Medical Officer of Health, stated that the defendant had been informed of the penalty he had incurred by his neglect, but he seemed to take no heed, and therefore in the interests of the public, he had felt it his duty to bring the case before the bench. This being the first case of the kind brought before the magistrates, they fined the defendant in the mitigated penalty of twenty shillings and costs, and trusted it would act as a warning both to him and others in the future, as the public must be protected.

Water Supply of Workhouses.

Mr. Montague Bere, Q.C., Judge of the County Courts of Cornwall, has delivered his decision in the action brought some time since against the Guard-

ians of the Poor of the Liskeard Union by the Liskeard Water Company. The action was nominally taken to recover three-quarters of a year's rent for water supplied by the plaintiffs, who are incorporated under a private Act, and who claim to be entitled to charge the Guardians at a special rate of £40 per annum on the ground, among others, that the water supplied to the workhouse is not supplied for domestic purposes. His Honour held that as far as the amount sued for was concerned, the claim could not be supported, as the powers given by the Plaintiffs' Act are confined to cases of agreement between the plaintiffs and corporations, etc., desirous of having such a supply of water. Demands made by the plaintiffs in August and December 1878, having been declined by the defendants, could hardly be considered an agreement. The plaintiffs, however, were entitled to some payment, as defendants had not paid anything since August 1878. In deciding the amount to be paid he would deal shortly with the arguments which were raised to show the defendants had brought themselves within the specified terms of the Act, because their use of the water was for other than domestic purposes. The contention was raised that the water was used for public purposes because the workhouse was a public place. He was of opinion that the words in the Act 'for public purposes' did not apply to the place where the water was used, but to the purposes for which it was used. These were hinted at in the General Waterworks Act, and were the cleansing of sewers and of drains, the cleansing and watering of the streets, the supplying of any pipe, pump, baths, and washhouses. A fountain, open to the public, but restricted in use, is not a supply for public purposes. Further, he was of opinion that the workhouse was not a public place. In the case 'Reg. *v.* Wallingham Union', a workhouse was held to be rateable, inasmuch as it was not devoted to public purposes, and was beneficially occupied. In the case 'Marks *v.* Benjamin' the word public received judicial interpretation. A place was public to which all persons had a right to go, whether gratuitously or for payment. Another objection that was taken was that the only persons to be supplied with water under the Act for domestic purposes were the owner and occupier of any dwelling-house, and that the guardians could not be called dwellers. The word dwell had been judicially interpreted. A railway company dwells at its principal station, a gas company where it carries on its business, a pier company where its registered office is, and, therefore, he came to the conclusion that the defendants were occupiers of the house in which they 'dwelt', and are a corporation who might demand water from the plaintiffs. As to the amount to be paid, it appeared that since 1862, under some agreement or other, the sum of £25 a year had been paid by the defendants. No record existed, but he must assume that everything had been done to make it binding, and that it was binding. The defendants had paid into court an amount calculated on the company's scale of prices—a descending scale, by which a house of £100 or above was charged at the rate of 3¼ per cent. He did not think the plaintiffs were bound by the scale in this case, and they might charge at the higher percentage—6 per cent.—but for the agreement, under which his Honour now made his award.—After ascertaining that the rent was formerly considered payable in advance, his Honour gave judgment for £25.

BRIEF NOTES OF USEFUL CASES.

Gas Company Powers.

1879. *Birmingham Corporation, In Re.* — Gasworks undertaking extending over the districts of several Local Authorities sold to one Local Authority, with a right to each Authority affected to repurchase its own portion—Principle of valuation for such repurchase. (*Times*, May 30, 1879.)

Legal Proceedings, various.

1879. *Weymouth, L. B. H., In Re.*—Nuisance on property belonging to a Town Council—Proceedings against Council—Appeal dismissed, proceedings being informal, it being shown that the Council were not owners *qua* Local Board and did not occupy. (*Times*, May 27, 1879.)

Borrowing Powers.

1879. *Reg.* v. *Reed.* "Education Act, 1870."—Borrowing by a Board for temporary purposes, and interest paid on money so borrowed—A payment for interest disallowed by Local Government Auditor, and Chairman of Board surcharged—Auditor's decision held erroneous. (48 L.J., Q.B., 729; L.R., 4 Q.B.D., 477; 44 J.P., 23.) [Decision reversed on appeal in the Court of Appeal, May, 1879.]

1879. *Bryant* v. *Lefever.*—Easement—Obstruction of air by adjacent building—Prescription—The free circulation of air round a building is not a privilege which the law protects, and an obstruction thereto is not actionable. (48 L.J., C.P. 380; 40 L.T., 579; L.R., 4 C.P.D., 172; 43 J.P., 478.)

Tramway.

1879. *Val de Travers Asphalt Co.* v. *London Tramways Co.*—Contract between Asphalt Co. and Parish to keep road in repair for a term of years—Road damaged by tramways—Suit by Asphalt Co. against Tramway Co.—It being doubtful whether the former body was entitled to sue, the Court allowed the Parish to be added as plaintiffs, though the Parish had not consented, Parish, however, to be fully indemnified against the costs. (48 L.J., C.P., 312; 40 L.T., 133; 43 J.P., 462.)

Borough Fund.

1879. *Reg.* v. *Leamington Corporation.*—Held that the proceeds of the sale of sewage ought to be carried to the General District Rate, to relieve the Rate, and not to the Borough Fund. (*Times*, Dec. 16, 1879.)

Adulteration of Food.

1879. *Liddiard* v. *Reece.* "Sale of Food Act, 1875," s. 8.—Appellant convicted of selling coffee adulterated with 40 per cent. of chicory—Held that though the package was labelled as a "mixture", yet it was not protected, the addition of the chicory being in fraud, because the full price of pure coffee was charged, and the purchaser's attention was not called to the label before the sale. (43 J.P., 781.)

Commons.

1879. *Harper* v. *Michell.* "Commons Act, 1876."—By-law—Letting off pigeon and falcon—Held by the Magistrate that the By-law did not apply to a man sporting with his birds, but held by the Superior Court that it did. (43 J.P., 796.)

County Courts and Nuisances.

1879. *Reg.* v. *Harrington.*—Nuisance—Jurisdiction of County Court.—A County Court Judge, where he can entertain an action for damage owing to a nuisance, has power to grant an Injunction to restrain such nuisance, and can enforce it by Attachment. (43 J.P., 829.)

Nuisance.

1879. *Flux* v. *Cumming.*—Two tenants occupying

a house with a common staircase—Application for an Injunction by the upper tenant against the lower one (a bath proprietor) to restrain the discharge of noxious fumes and hot vitiated air, which ascended the staircase and caused a nuisance—Injunction granted. (*Times*, Aug. 5, 1878.) Subsequently question at issue sent to a Jury—Per Coleridge, J.: "The trade being a lawful one, in a lawful place, it was for plaintiff to prove that it was exercised in an unlawful way"—Verdict for defendant—New trial refused—(*Times*, May 30 and June 24, 1879.)

HIGHWAY.

1879. *Danby* v. *Hunter*. "Highway Act, 1835," s. 76.—"Waggon"—Cart without name on it—The section applies to a cart or carriage, *ejusdem generis*, with a waggon, and not to a light spring cart much used for carrying persons and paying duty under 32 and 33 Vict., c. 14, s. 18. (49 L.J., M.C., 15; 41 L.T., 622; L.R., 5 Q.B.D., 20; 43 J.P., 781.)

UNWHOLESOME FOOD.

1879. *Reg.* v. *White*. "Public Health Act, 1875," ss. 116-7.—Unsound meat seized and condemned—No notice to owner to appear before the Justice who condemned the meat—Nevertheless, conviction held good. (49 L.J., M.C., 19; [*W.* v. *Redfern*] L.R., 5 Q.B.D., 15; 41 L.T., 524; 44 J.P., 87.)

STREET OBSTRUCTIONS.

1879. *Chelsea Vestry* v. *Stoddard*. — Carriages standing in front of stables—Claim of right to use the highway whilst the carriages were being cleaned—Claim held valid, the highway having been dedicated subject to the right to obstruct it occasionally for the purpose in question. (43 J.P., 782.)

LOCOMOTIVES ON HIGHWAYS.

1879. *New River Co.* v. *Kitchener*. "Locomotives Act, 1861."—Bridge over river broken down by locomotive—Damage to bridge and damage to locomotive—Cross actions between the owners of the bridge and of the locomotive—Held that the owners of the bridge were entitled to recover for the damage done to the bridge, but were not liable for the damage done to the locomotive. (*Times*, June 25, 1879.)

CORRESPONDENCE.

[All Communications must bear the signature of the writer, not necessarily for publication.]

HOT-AIR CHAMBER FOR DISINFECTING CLOTHES.

Will you allow me very briefly to answer the questions addressed to your readers in the last issue of the SANITARY RECORD, from the results of my own observation of the working of a disinfecting stove, which has been in use now for more than three years at the Borough Disinfecting Station and for seven years at the General Hospital, Nottingham? The apparatus to which I refer is that devised by Dr. W. H. Ransom, F.R.S., of this town, and to which he gave the name of 'The Self-Regulating Disinfecting Stove'.

The objections which Dr. Ashley has found in the practical working of a stove which is heated by means of a flue which partly surrounds it, is one that has been experienced by many others, myself among them. There is absolutely no certainty with such an apparatus as to the temperature to which articles of clothing, etc., are subjected in their different parts. They may, in fact, be either scorched, or, on the contrary, imperfectly disinfected. With the apparatus to which I refer, on the other hand, there is almost perfect precision in our knowledge of the temperature to which the contents are subject in every part thereof. We may be quite sure that when it is at work, and the temperature of inlet and outlet in their proper relations, that any article of clothing, etc., therein, say, for instance, a blanket, has been exposed throughout to a uniform temperature of exactly 3° or 4° below that registered by the thermometer at the inlet.

The numerous experiments which Dr. Ransom made in conjunction with myself, in 1873, on the singeing point of various textile fabrics, and recorded by him in his paper, 'On the Mode of Disinfecting by Heat', read at the British Medical Association that year, showed that almost all fabrics may be kept at a temperature of 250° F. for three or four hours without risk of damage. At a meeting of the Metropolitan Society of Medical Officers of Health, in May 1877, I myself exhibited a hospital blanket which had been thus baked thirty times, and which, to all appearance, was in condition quite as good as one of the same quality which had been in use as long, but which had not been periodically subjected to the same process. It has been proved, both by experiment and observation, that this temperature (250° F.) will amply suffice to disinfect bedding, clothing, etc., infected with the poison of small-pox or scarlet fever, or, in other words, that the particulate contagia of these diseases when heated by this temperature cease to be able to spread them. There are many objections to the use of $S.O_2$ or Cl for the disinfection of bedding and clothing, valuable as they are for other purposes.

EDWARD SEATON, M.D.

June 7th, 1880.

HOSPITAL ACCOMMODATION FOR INFECTIOUS DISEASES.

May I beg the favour of the insertion of a few words in reply to your 'editorial' remarks on the communication by a 'Medical Officer of Health,' which appeared in your last issue. It is a dangerous matter to differ in opinion with an editor, but in the present instance, knowing my editor to be good-humoured and courteous, I am not afraid to do so. I can assure you, on good grounds, that very considerable ignorance exists as to the relative responsibilities and duties of Sanitary Authorities and Boards of Guardians as regards the providing hospital accommodation for cases of infectious disease. This is, I think, proved by the fact of the existence in many places of separate hospitals, one under Poor-Law control for paupers, and another under that of the Local Sanitary Authority for that class able to pay for such accommodation—Bristol, for example. I could name many others. This fact, I think, proves that the idea of divided responsibility is still prevalent, and that the intentions and opinions of the Local Government Board have not been sufficiently promulgated or made known; and the sooner they are made known the better for the community at large. In justice to the Sanitary Authority of the city referred to, it should be stated that in all cases in which payment for hospital accommodation would have been prohibitory, no payment was demanded. I must also add that the greater number of cases of small-pox were sent to the workhouse, not on account of any prohibitive price for admission, but because the Sanitary Authority really believed that the Poor-Law Authorities were bound to take charge of all cases unable to pay. In fact, the definition of 'pauper' was not understood by either party, nor do I think it is clear now.

I quite agree with you that 272 cases of small-pox, occurring within a given time, constitute an epi-

demic; but when I tell you that, excepting about 40, all occurred within a very limited area, and that no cases occurred in first or second-class streets, and also that scarcely a case occurred in the higher ranks of society, I think you will agree with me that the epidemic cannot be called 'widely spread'. I also fully agree with you that there should be undivided responsibility in all cases of infectious disease as regards means of isolation, and that the Sanitary Authority is that on which such responsibility should rest; but to effect this the Poor-Law Authorities must pay their share by some pecuniary arrangement; but how are the terms to be settled, and by whom? In the present instance, the two authorities are unable to come to terms, and, as the Immortal Bard has it, 'It is a very pretty quarrel as it stands.'

MEDICAL OFFICER OF HEALTH.

June 2nd, 1880.

THE HEALTH OF RAMSGATE.

Sir,—My attention has been called to a letter in the *Daily Chronicle* of June 3rd, in which the writer states that there have been a great number of deaths from scarlet fever here, and that the malady is on the increase. Moreover, that the town is in an unhealthy condition generally. These statements I beg to emphatically deny. True, there have occurred isolated cases of scarlet fever from time to time, some of which have proved fatal, but no epidemic has existed such as the correspondent of your contemporary would lead you to believe. For the last three months the number has been steadily decreasing, and there are very few cases in the town at present. The number of fatal cases is as follows:—January, 1; February, 5; March, 1; April, 2; and May, 2—making a total of 11 during the five months, in a population of 26,000. As is usual in watering places, many of the cases were imported by visitors. I am assured by those best acquainted with the drainage that the statements which have been made to the correspondent of your contemporary in this respect are also without foundation.

RICHARD LYDDON,
Medical Officer of Health for Ramsgate.

Town Hall, Ramsgate, June 9th.

VENTILATION OF DRAINS AND SEWERS.

I have to thank your correspondent, 'A Master Tradesman', for his communication to you at page 439, for two reasons—1. Because there is nothing that brings one's views more before the public than having them abused; and, 2. Because it enables me to give an explanation, which I fancied was unnecessary, viz., that the wood-cuts at pp. 361 and 397 were not drawn to scale; in practice, the drains and ventilating-pipes would probably be larger, and the trap itself smaller. The shape of the latter was not strictly accurate in drawing. My principal object in all I have written was to point out how to prevent sewer-gas from entering houses already built; and the only way that I am aware of is to cause it to stop (by masons' trap or syphon bend) outside the house, and there to give it a ready access to some few feet above the roof by a ventilating pipe.

I always thought that the sanitary art was even now in its infancy. I have, therefore, not much to complain of in being only an 'apprentice-sanitarian'. As, however, your correspondent is 'rather amused' at my ideas, I shall be glad to listen to the sanitary recommendations of a veteran-sanitarian of the old school. He says a masons' trap is a 'very dangerous appliance, as, when made by masons', it often (!) leaks over the top or around the sides of the tongue, and so is a sham.' He may be 'amused' to know that the authorities of the town where I am writing, and where a good many houses are always being built, have entirely discarded syphon bends in favour of masons' traps, and that no house is now passed by the sanitary officer, as fit to be taken into use, unless it has a masons' trap and ventilating pipe at some place where the drain leaves the house. Therefore, if I err, I can only say that I do so in good company.

J. R. T.

SOIL-PIPE VENTILATION.

The Medical Officer of Health of Blackpool suggests a system of soil-pipe ventilation, which in principle bears a close resemblance to a system suggested by me and described in the *Building News* of September 27th, 1878, as follows:

'The arrangement consists of an inner and outer tube, the inner tube acting as the soil-pipe, having perforations immediately above and below the inlets from the water-closets. The action in use would be as follows. The air, suddenly displaced by the falling fæces and water, would escape through the perforations, where, its force extended to such a larger area, would be completely nullified; and in the same way syphonic action could not exist, as there would always be air in the outer tube in equilibrio, which would fill up the vacuum caused by the sudden displacement.'

The ends of the outer tube being cut off near the drain-pipe connection, and carried above the soil-pipe outlet over the roof, a constant current of air would pass through it. And, as the fæces would not come in contact with the outer tube, there would consequently be no danger, even if the inner tube or soil-pipe was corroded through. If the Medical Officer of Blackpool would add the outer tube as described, it would be a most rational and safe system of soil-pipe ventilation.

B. H. THWAITE.

Bolton, May 1880.

VENTILATION OF SOIL-PIPES AND HOUSE DRAINS.

In his observations under this heading at p. 362, March 15th, Mr. Rawlinson gives his opinion upon certain points with which I agree, but in some of his remarks I find a difficulty in doing so. I am glad to see him stating that the waste-pipe from kitchen sinks should discharge 'under' the grating, and not over it; at the same time I make bold to challenge his statement that the sink-pipe does not require trapping. He approves of a 'flap-trap' or valve, which shows, he thinks, it requires a 'trap' of some sort. Now, I do not approve of this 'flap-trap', and consider it a much less efficient safeguard than the ordinary lead syphon trap. The 'flap-trap' I consider to be unscientific and dangerous, because so liable to fail in being perfectly air-tight. If not air-tight, then this dirty sink-pipe acts as an admitter of foul air continuously into the house, and as the air-current in the pipe soon dries it, then foul or perhaps even disease-breeding particles can be blown into the atmosphere of the house through the sink-pipe, even supposing a 'flap-trap' be upon it, whereas the water in a lead syphon trap arrests both foul air, as well as disease-breeding particles. Mr. Rawlinson ought to think this matter over again, I consider. Mr. Rawlinson further says the trap between the

house-drain and the sewer is not needed, and also that trapping is more of a hindrance than a benefit, and also that it is not possible to over-ventilate sewers and drains. Now, I confess myself unable to follow him in these statements, and should like to see him giving a drawing or sketch in this journal of his ideas, so that we may be able to know properly what he really means to show. I consider both sewer and drain are over ventilated if they are in open connection with either the soil or waste pipes of a house. I also consider that every house or dwelling should have its drains trapped off from the main sewer; if Mr. Rawlinson really thinks differently I should like to hear his reasons. I would rather that some other correspondent had alluded to these points in your April issue, but as such was not done, I respectfully beg to ask Mr. Rawlinson to give a little explanation upon the points I have referred to, so as to prevent misunderstanding, and bring out the real merits of the points involved.

Glasgow, April 30, 1880. W. P. BUCHAN.

TYPHOID FEVER AND THE REGISTRATION OF DAIRIES.

The following letter from Mr. H. W. Case, the Treasurer of the Bristol and West of England Dairymen's Association, has appeared in the local papers:

'Attention has been again called to the necessity of carrying out, in Bristol, the spirit, as well as the letter, to the full intent of the Act of Parliament relating to the better regulation of Farms, Dairies, and Milkshops, by the recent outbreak of fever in our midst through alleged milk contamination. Our vigilant medical officer, Mr. Davies, has again wisely asked the question of our local authorities in his first report on the present epidemic as to whether they considered "perfunctory registration" to be sufficient. It is true external form is satisfied, but except through the vigilance and well-directed energies of our esteemed medical officer no practical step has been taken towards checking the calamitous outbreak of the epidemics which every now and then bring pain, distress, terror, and death into the houses and families of the community. In an article in the issue of the SANITARY RECORD, for May 15th, a copy of which appeared in your columns of May 21st, the editor reiterated his before-expressed views as to the absurdity of placing the sanitary regulation of dairies under the control of the Local Veterinary Authority, trusting that the attention of the new Parliament would without delay be drawn to so glaring an anomaly.

'This all accords exactly with the minds of the better-intentioned local dairymen who have attempted, without success, by the Secretary of the Bristol and West of England Dairymen's Association, in accordance with a resolution of that body, to send a deputation to the Cattle Plague Committee of the Local Sanitary Authority, stating their desire that a thoroughly efficient officer, with full power and time to attend to his duties, be appointed. They now contemplate instructing a medical gentleman on their own behalf, so that they may in a direct way, though in a small degree, benefit the public, whose well-being is identical with their interests, and as a secondary matter lessen the alarms which have so prejudicial an effect on their business. This is, in substance, what I stated in the letter which the editor of the SANITARY RECORD has commented upon.

'Our secretary holds a lengthy report of the inspectors in Dublin, as well as the metropolis and other large towns, where they enjoy an immunity from these calamities which we quite envy; and what must be the feelings of lodging-house keepers, hotel-keepers, and others simply because the regulations of the Act are fully carried out, nearly without oppression, enlightening and helping the ignorant, and punishing only the obstinate?

'The disastrous epidemic which a certain milk company in London were the unfortunate means of spreading about nine or ten years ago, and some of the effects of which I was an eye-witness, with one or two smaller ones which followed, there and elsewhere, led those authorities promptly to adopt such measures as have apparently stood the test and secured, thus far, immunity from disease from this alleged source, though doubtless there remains much to be done.

'I believe Mr. Davies and other medical authorities concur in thinking we are on the eve of great discoveries in this department of sanitary science.'

SANITARY JOTTINGS.

Messrs. Wright and Mends, English engineers, have gone to Milan to organise a scheme for waterworks for drinking purposes.——John Longdon, a member of a family of notorious 'cheap' butchers, has been fined £120, with an alternative of three months' hard labour, at the Derby Borough Police Court, for exposing for sale twelve pieces of mutton affected with rot. These diseased meat cases have been very frequent of late, and we are glad to see that, as a rule, they are vigorously punished; imprisonment, without the option of a fine, being very properly inflicted in some instances.——In the *Bulletin de l'Académie Royale des Sciences de Belgique*, for February, will be found a paper by M. Donny, 'on a Convenient Means of distinguishing Artificial from Natural Butter.'——There has been a very marked improvement in the healthiness of Cyprus in the past year, the death-rate among the troops having been 25.14 per thousand lower than in the previous one.——Dr. Hearder, superintendent of the Joint Counties Asylum, Carmarthen, has abolished the use of intoxicating liquors in that institution.——The Drapers' Company have subscribed fifty guineas towards the Parkes Museum of Hygiene.——A public meeting in Shrewsbury has authorised the Town Council to impose a special rate, in order to raise funds to oppose in Parliament the Liverpool Water Scheme Bill.——The payment of medical officers of health by fees, which has been adopted by several unions in Devon and Cornwall, was stated by the Local Government Board, in a letter recently received by the Okehampton Rural Sanitary Authority, to be contrary to the intention of the Public Health Act, and therefore not to be sanctioned.——The mortality statistics of Calcutta, for the third quarter of 1879, show satisfactory progress. The deaths from fevers, cholera, dysentery, diarrhœa, and small-pox, all show a decrease; although the general total of deaths is not much below the average of the last ten years.——Dr. Barry has sent us another of his admirable special reports on the health of individual places in his district, the report, on this occasion, relating to Morton, the Keighley rural sanitary district. It differs in no respect from those which we have already noticed.——The salary of Dr. Pitt, Medical Officer of District No. 1 of St. George's in the East, has been increased to £280, in consideration of the additional area included in his district.——

The mortality statistics for Calcutta, for the third quarter of 1879, show satisfactory progress. The deaths from fevers, cholera, dysentery, diarrhœa, and small pox, all show a decrease, although the general total of deaths is not much below the average of the last ten years.

AT the first meeting of the members and friends of the Nineteenth Century Building Society, its objects were explained to be different to the older societies, in that its rules provide that special attention should be paid to the sanitary condition of the houses to be purchased for the members. Another noticeable feature of this new society is that women will take an active part in its management. The following were elected as directors: Mr. George Palmer, M.P., Mr. Mark H. Judge, Miss E. Orme, Miss Mary E. Richardson (member of the London School Board), and Mr. W. J. Rawley. Mr. Frederick Long was appointed manager and secretary. We shall watch the progress of this society with interest.

DIETETIC NOVELTIES.

LENTILLA.

Under this title Messrs. James and Co. have succeeded in so preparing lentils, that their well-known nitrogenous value as food can be utilized in a variety of other ways than in the popular and, if well prepared, palatable lentil soup. Lentilla can, however, if the directions supplied with it be carried out, be made into excellent and very nourishing rissoles, cakes, puddings, and blancmange at a very small cost. It can also be used as a thickening for ordinary meat soups, affording an agreeable and highly nutritious change from the ordinary winter pea-soup. Practical housewives will welcome in this form of lentils the means of adding many economical and highly nutritious dishes to the family table, especially where there are growing girls and boys, to whose development the large proportion of nitrogen contained in lentils will be of the greatest possible aid.

NOTICES OF MEETINGS.

THE TURIN CONGRESS OF HYGIENE.

This conference is to be held early in August, and is to last a week, but the exact day of opening is not yet fixed. At the conference held in Paris in 1878, it was decided to hold a Congress in Turin in 1880, and the 'Società d'Igiene di Torino' has undertaken its organisation. The co-operation of the town officials has been readily given, and a grant of 10,000f. has been voted towards meeting the expenses that will be incurred. The Ministers of the Interior, of Foreign Affairs, and of Education, have promised their assistance; the University and other bodies have announced their intention of throwing open suites of rooms, museums, libraries, etc.; and the King has graciously consented to become the patron. Foreigners are especially invited to attend, and it is announced that while French is generally regarded as the official language of International Congresses, addresses may be given in any language, and they will be translated and published in French and Italian. The general scope of the Congress is to be the same as that of Brussels in 1876, and of Paris in 1878, but all matters of detail are to be decided at the Congress. Professor Hyacinthe Pacchiotti, Rue Saint François de Paule 25, Turin, is ready to receive names of those interested in the Congress, and to send information. As at present arranged, the sections will be as follows: 1, General and International Hygiene; 2, Domestic Hygiene; 3, Professional Hygiene; 4, Hygiene of Schools and of Children; 5, Hygiene applied to Agriculture; 6, Hygiene applied to Industries; 7, Veterinary Hygiene; 8, Naval and Military Hygiene; 9, Safety Appliances of all kinds; 10, Chemistry, Architecture, etc., applied to Hygiene.

NEW JERSEY STATE AGRICULTURAL SOCIETY.

The Sanitary Exhibit of the New Jersey State Agricultural Society, which holds its annual fair at Waverley Park, on Pennsylvania Railroad, between Newark and Elizabeth, September 20, 21, 22, 23 and 24, will be under the superintendence of the New Jersey State Board of Health. In addition to the catalogue premiums in classes, the judges will also confer decorative medals for the best exhibit in each of the following groups: 1. Ventilating and Smoke-Consuming Appliances; 2. Water-Supply Apparatus, Filters, Sanitary Conveniences and Disinfectants; 3. Sewage Conductors and Receptacles, Tanks, Cesspools, etc.; 4. Water-Closet and Emptying Apparatus; 5. Life and Labour-Saving Apparatus. A suitable building, supplied with water, is provided, and the actual working of ventilators and various other appliances can be shown. The offices of the New Jersey State Agricultural Society are at No. 764, Broad Street, Newark, New Jersey.

BRITISH MEDICAL ASSOCIATION.

The forty-eighth annual meeting will be held at Cambridge, August 10th to 13th, 1880.

SECTION D. PUBLIC MEDICINE. — *President:* Henry W. Acland, M.D., LL.D., F.R.S., Oxford. *Vice-Presidents:* Arthur Ransome, M.A., M.D., Manchester; Thomas Pridgin Teale, M.D., F.R.C.S., Leeds.

The following is the proposed order of business. Wednesday, August 11th, 2 to 5 P.M. Address by the President of the Section. Discussion.—'The General Working of the Public Health Administration in Great Britain and Ireland.' The discussion will be opened by Alfred Carpenter, M.D., President of the Council of the British Medical Association, and Francis Bond, M.D., Medical Officer of Health for the Gloucestershire Combined Districts.—Thursday, August 12th, 2 to 5 P.M. Papers. — Friday, August 13th, at 11 A.M. Discussion. — 'Diseases communicable to Man from diseased Animals when used as Food.' The discussion will be opened by Francis Vacher, Esq., Medical Officer of Health for Birkenhead, and Edmund Syson, Esq., Medical Officer of Health for the Huntingdonshire Combined Districts. Fifteen minutes are allowed for the reading of each paper, and ten minutes for each subsequent speaker. Any gentleman wishing to take part in the discussions, or to read a paper on any other subject in this Section, is requested to communicate with the Honorary Secretaries, William Armistead, M.B., Cambridge; Thomas J. Walker, M.D., Peterborough.

An Exhibition of Sanitary Appliances will be held in the Guildhall, Cambridge, during the week of the meeting, commencing on Tuesday, August 10th. Applications for space to be made to William Armistead, M.B., St. Mary's Villa, Station Road, Cambridge.

REPORT

ON THE

IMPROVED VENTILATION OF THE COUNCIL CHAMBER, GUILDHALL.

THE first notices of the Banner system of sanitation in the SANITARY RECORD were published on May 15 and June 5, 1875, and from then until now that journal has continued to express a high opinion of it. The SANITARY RECORD was amongst the very first to introduce it to the notice of the public; hence my reason for making public this description through the same medium.

The notices above referred to were upon my lever trap, patented in 1872, and my ventilating cowl for soil-pipe, etc., patented in 1874. The first was exhibited at the International Exhibition in 1874, and the latter was shown at the Sanitary Congress held at Glasgow in the autumn of that year.

The system was carried out at my own house in 1874, and was very fully discussed and criticised at the time of the Sanitary Congress held at Brighton in October 1875, and afterwards by most of the leading medical and scientific journals.

The combination of inlet trap and cowl, as then introduced, was considered a startling innovation by the most advanced sanitarians, and one or two practical plumbers only expressed strong disapproval of it.

The *Architect* wrote upon it under the expressive heading 'Notes on Novelties, on the 20th Nov. 1875, and the *Builder* on the 11th Dec. following. The *Building News*, the *Metropolitan*, and many other important mirrors of public opinion, also honoured it with highly commendatory notices, and frequently since. It is singular, but no less true, that no journal of any kind has questioned the correctness of the principles on which it is based. It is equally true that no sanitarian or publication prior to 1874 had made the least mention of any similar system; while in the SANITARY RECORD of last month I see it is stated that all true sanitarians are imitating it, and that the same system of soil-pipe ventilation is now that which is most extensively used by the leading sanitary engineers.

The object of this is to bring what has been done towards the improved ventilation of the Council Chamber more fully and more clearly under notice than has been previously done, and in order to make myself the better understood I accompany this with fresh drawings and plans.

I must first state what the conditions as regards the ventilation of the Council Chamber were when I first saw it. Practically, it was almost hermetically sealed, as there was no fireplace, there was consequently no chimney, and there was no outlet from the dome into the double lantern light: the only intended outlets were the small opening above the rosette in the centre of the ceiling, over the Lord Mayor's chair, and the large long horizontal tube from the sunlight in the dome, which were both carried into one large vertical shaft, commencing above the former. The second large shaft, that over centre of gallery annex, put up in July 1878, afforded, like the other, no relief—valves, cones, and burners had to be put into both to prevent down draught; the only windows are close to the ceiling at each side of each annex, and could only be opened with impunity in hot weather; besides the sunlight which passes through the centre of the lantern light there were eight gasaliers burning all day. Thus the Chamber was almost hermetically sealed, for practically there were neither inlets nor outlets for air, and by the time that from 200 to 300 persons had been in it for an hour or two, the atmosphere became very bad indeed, and these conditions are said to have resulted in very general and serious complaints from all those who were long present, and in many in suffering from what was called 'a Council Chamber headache', and there existed no real means of obviating this unpleasant state of things.

Since the alterations which I have made have been in operation, I am informed that no one has suffered from 'Council Chamber headache'. Repeatedly in the early autumn of last year, with the thermometer outside between 59° and 64°, when the system I have applied was allowed full play, the temperature within the chamber never was more than two degrees above the external temperature, though 200, and sometimes nearer 300 persons were constantly in the Chamber for several hours together. What, I ask, can be thought of such a result produced entirely as it is from the system I have introduced, when I see it certified in *Sanitary Engineering*, p. 107, by that well-known authority, Mr. Bailey Denton, that, 'In a room 13 by 15½, and 10½ feet high, after three hours the temperature, 9 inches below the ceiling, rose 17½°, and at 5 feet below the ceiling, 15° above the temperature recorded before doors and windows were shut, with a fire, three gas burners, and only two persons present.' A room of the dimensions given is equal to an air space of about 2,100 cubic feet, and two persons present, gives over 1,000 cubic feet of air space for each. The Council Chamber is about 60 feet long, 30 feet wide, and 32 feet high (encompassed almost wholly by outside walls), giving a clear air space, furniture, etc., deducted, of about 50,000 cubic feet, which for 250 persons, gives to each an air space of only 200 cubic feet. To keep, then, the temperature of the Chamber within two degrees of the external temperature in summer, is, I assert, a feat in ventilation which has never before been approached. A change occurs in the state of things, and we have an unprecedentedly severe winter to deal with. It must be borne in mind that I was asked to ventilate, not to warm the Chamber, though what I have done facilitates the latter, inasmuch, as the warm air is now drawn from the coils into the

Chamber, instead of being left to leisurely find its way there.

The existing warming power was, and is, unquestionably very deficient, being about one third only of what it ought to be, viz., 334 feet of 3-inch pipe, instead of 2,100 feet of 2-inch. With the external temperature at or about 35°, and the temperature within the Chamber raised by the animal fires of 200 or 300 persons to 70°, that there is a great rush of cold air into the chamber through the door, whenever it is opened, cannot surprise any reasonable persons who will fairly consider the matter; 70° within any chamber means a large vacuum, if the atmosphere outside it be only or near 35°; it should be borne in mind that air rushes into vacuum at the rate of 1,329 cubic feet per second. On one occasion when I was myself at the Council Chamber the temperature outside was 40°; inside the Chamber at 12.15 the thermometer registered 55 (the furnace to heat the existing coils had been alight about six hours); at 2 o'clock it registered 60°, and at 5.30 it was only 64°, though over 200 persons had been in it for about six hours. It is calculated that one man heats 777 feet of air 1° per minute. Here again, I claim to have accomplished a feat in ventilation, and this in winter with nearly all the inlets for fresh air closed (as windows are closed in cold weather), with a sunlight and several gasaliers kept alight the whole time, without even a fireplace and chimney to assist, as they do in most rooms, to alleviate the most unhealthy state of things brought about in any unventilated room with some 200 persons present.

When the inlets for the admission of fresh air are nearly all closed, then the only means for its admission is the door, which is full 8 feet high and nearly 5 feet wide, a superficial area of about 40 feet, while the whole superficial area of the 23 inlets provided by me does not exceed 8 feet, and nearly all of them, as I have said, were closed on the occasion I refer to.

It is perfectly well known that before I did anything, great draughts—down-draughts as they are called—were complained of, and that the same are still at times complained of, is not chargeable to me. I must not omit to mention, as very noteworthy, especially for those who complain of down-draught, that the total length of the interstices round the inlets which are provided within the chamber (when the valves in them are closed), and at which cold air could possibly enter, does not amount to what of necessity exists round the frames of the windows of very ordinary size for an ordinary sized room.

Let me now call attention to the fact that when the door of the Council Chamber is also shut, almost the only means left for fresh external air to enter it is through the gratings in the floor for warmed air. I had the grating which admitted the impure air of the basement into the hot air chamber closed.

When the hour of meeting in the Council Chamber arrives, it is usual to let the fire out in the furnace, but during the most crowded meetings it is customary to keep the gasaliers burning. They, of course, consume a considerable amount of fresh air; owing to the very insufficient warming power it may be advisable to use these gasaliers to warm the chamber before the time of meeting, but surely their being kept alight afterwards cannot fail to unnecessarily heat and vitiate the air of the Chamber when there are 200 or 300 persons in it.

It is authoritatively stated that carbonic acid gas, being so much heavier than air, rests mostly near the floor level, and this was my reason for putting the extra shaft X. If even the seven exhaust cowls from the ceiling overpower it, it serves the better to diffuse fresh air drawn from the roof throughout the whole space, with which object I put the inlets, Nos. 15, 16, 17, through the floor, and when these are not required for the Council Chamber, this shaft may be used to effectually ventilate the Records.

To people variously interested in the working of any system, an inventor or innovator is scarcely ever a welcome personage and is often considered one who must be kept at arms length.

I cannot of course hope to satisfy every one in a body of 200 or 300 persons; a few out of the number may complain that they are subject to a draught, others that they are too hot, but the great majority, including the officials who are always present, will I feel sure admit, not only that the atmosphere within the Chamber is greatly improved, but will go further and say that it is now capable of being kept comfortable, healthy, and as it should be.

If it really be thought by the members generally that what I have done to improve the ventilation of the Council Chamber is detrimental in any way to their health and comfort, I have provided the means, by valves at every point, of most effectually rendering the whole, temporarily or otherwise, entirely inoperative at any time in less than ten minutes, and thus to make the Chamber what it was, as regards 'ventilation', before I did anything to it. I unhesitatingly say, however, provided intelligent application be made of the means now existing, the Council Chamber is the best ventilated room in the Guildhall or elsewhere. I may also mention that since I inaugurated this novel mode of ventilation, that the Hall of the Royal Institute of British Architects has been ventilated on almost identical lines, so far as the application of general principles is concerned; and even there, under certain modifications in other respects which I feel certain are prejudicial, the result is I hear considered 'splendid ventilation'. Complaints of draughts at the inlets were at first made by some of the members, but these I believe have ceased since the inlets have been heightened and valves put into them to regulate the supply, as varying circumstances render necessary, without closing their external orifices.

The system of ventilating the soil-pipe, etc., which was introduced by me a few years ago, is now so well known, and is so generally adopted, that I need only refer you to the accompanying drawing and description of it.

With the aid of the accompanying drawings and plans, etc., I will now proceed to explain the alterations I have made, and state the results obtained by them.

The system depends mainly on the efficient action of the exhaust ventilators, combined with the judicious arrangement of proportionate inlets for fresh air, placed at various proper positions in the space to be ventilated. The exhaust power of the ventilators varies with the velocity with which the wind passes through them. The average, accelerated by cones and burners, may be reckoned as about 300 feet per minute.

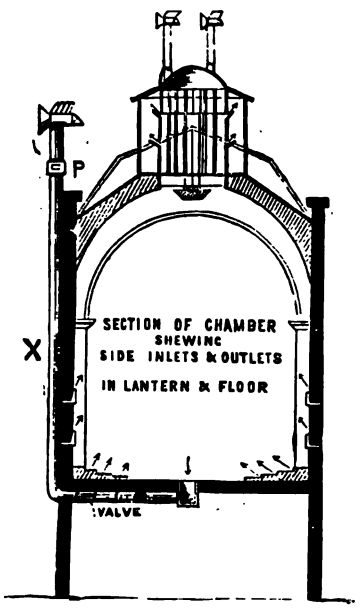
By experiments lately conducted at Hove, a given volume of air passed through a Banner cowl, at various velocities, was found to create an induced current on an average of careful tests of over 26 per cent.

I have placed above the roof eight 14-inch Banner cowls on suitable shafts, in each of which the sectional area for egress of air is about one square foot, giving a total of about 1,200 inches. Seven of the exhaust ventilators withdraw the air at the ceiling, and one of them, X, from the floor, through the pre-

viously existing gratings. This latter, in winter, when warmed air is required, will, by a valve for the purpose, be inoperative, but can then be used to ventilate the 'Records', while in summer it may also be readily made to supply fresh air to the chamber from above the roof. The seven from the roof are placed one at each end of each annex, each drawing

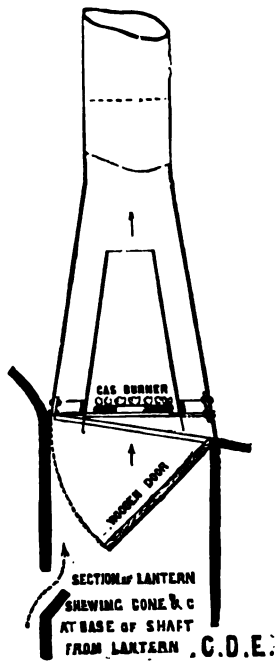
PLAN OF CEILING SHEWING OUTLETS

from above two rosettes in the flat ceilings, the other three are carried from the space between the double lantern above the dome, into which there are seven outlets from the chamber, each being 17 inches long

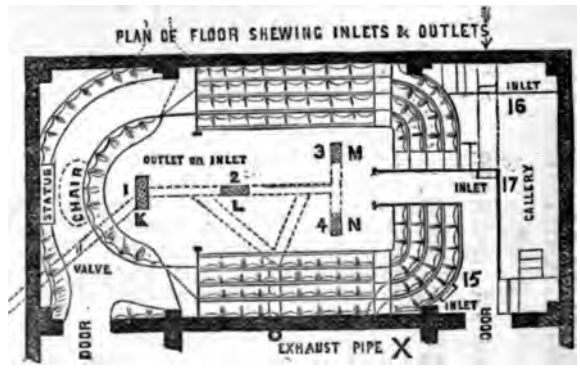


and 5 inches wide, in two tiers—three in the upper and four in the lower tier. At the base of each shaft is a wooden flap or door, which on being closed renders the cowl mounted upon them completely inoperative, while, if the wind be insufficient, there are cones and gas burners just above the wooden doors, which, when lighted, will very greatly increase the current of vitiated air from the chamber, as you will notice by the annexed tests. I may mention that these cones and burners are not a mere flame in the centre of a large shaft, as was sometimes previously put, serving for little more than to show the air the way in such shafts when it was inclined to go either up or down them. These shafts are lettered in the plan A to G and X, and the doors, valves, cones, and burners are shown in section, as well as the double lanterns, etc.

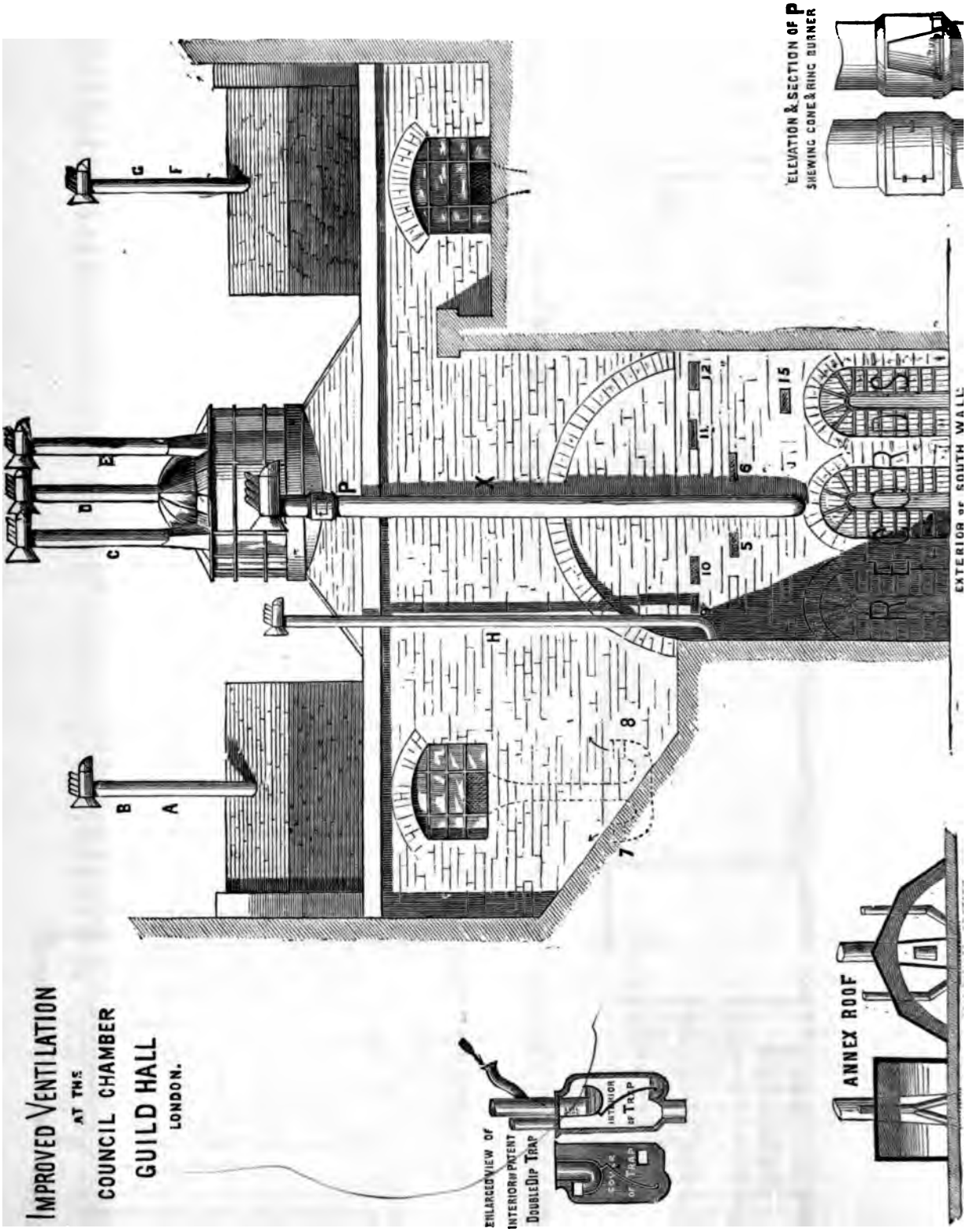
The plan, etc., also shows the inlets for fresh air placed at twenty-three different positions within the chamber, each of which is numbered 5 to 27, as per list, showing the size of each. There are ten on each side of the Council Chamber and three, 15, 16, 17, from the floor. These latter are so placed for the purpose of obtaining a more thorough diffusion of air in the whole space, which object is further promoted by the gratings 1 to 4 in the floor, whether



warmed or fresh air be drawn in thereat. The total superficial area of inlets is about 1,650 inches, or about one superficial inch for every 30 cubic feet of clear room space. The whole may be entirely closed at pleasure by means of valves provided, or they may be regulated as the number of persons present, or as the velocity of the wind, or the external temperature, may render desirable. There is a clear air space in the chamber of about 50,000 cubic feet. The



result sought to be worked out by the foregoing arrangement, which is suitable for all public buildings and large rooms, is that at less than the average velocity of the wind the air within the Council Chamber may be imperceptibly renewed about three times within an hour, thus—


IMPROVED VENTILATION
AT THE
COUNCIL CHAMBER
GUILD HALL
LONDON.
ELEVATION & SECTION OF P
SHEWING CONE & RING BURNER
ENLARGED VIEW OF
INTERIOR OF PATENT
DOUBLE DIP TRAP
INTERIOR OF TRAP
EDGE OF TRAP
ANNEX ROOF
EXTERIOR OF SOUTH WALL

Per minute.....300 feet.
1 ventilator 1 ft.; No. of ventilators 8

2,400 „
Each 20 minutes ..... 20 „

(Sun-light, etc.) 48,000 „

Gratings in floor for warmed air from coils or for fresh air from roof; these may be used also as outlets at floor level.

1	2	3	4
K	L	M	N

Inlets for fresh air, covered externally with perforated zinc, and fitted with valves inside to prevent or regulate the supply.

South side, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.
Ea. 24 × 2¼ 18 × 4 12 × 6.
North side, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27.
Through floor in gallery annex, 15, 16, 17.
Carried up about 5 ft. 14 × 4 10 × 4¼ 15 × 4¼

FIG. B.

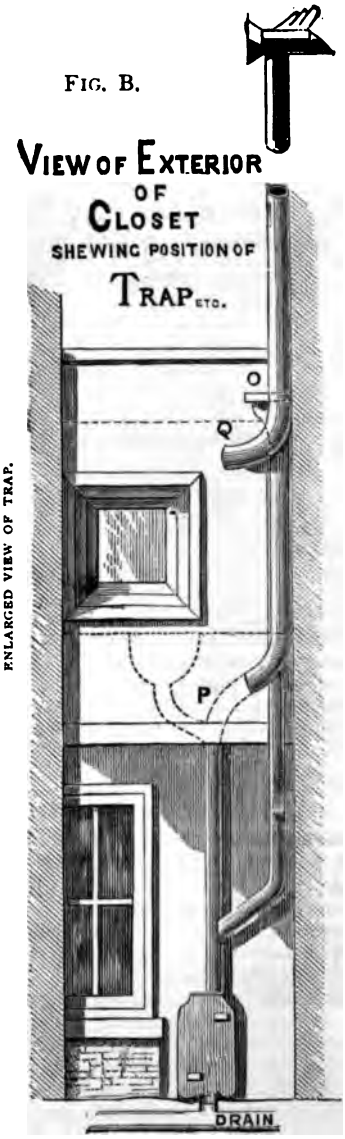


Fig. B represents the soil-pipe and closet arrangement. O is the head of a 3-inch rain-water pipe, which serves also as inlet for fresh air to the 4-inch soil-pipe, a little above the double-dip trap. P is an elongation of the soil-pipe from just below a Pearson's trapless closet. From the point Q the continuation of the soil-pipe upwards, and on which is fixed a patent ventilating cowl, is 6 inches, and by this arrangement the room in which the closet is is ventilated through a perforated zinc grating placed at the base of Q, near the ceiling level. The trap admits of the drain also being ventilated through it without exposing even for a moment any impure matter, an advantage of the utmost importance, as anyone can learn by reference to page 60 of that admirable little work, *Sanitary Arrangements for Dwellings.*

RESULTS.

17 Oct. 1878.—External temperature at 3.10, 58½°. Temperature in chamber—

At 11 A.M. ... ... 59°
„ 4 P.M. ... ... 64°

Four of the gasaliers and the sun-light burning all day.

Velocities per minute in outlets from inner lantern, 17 in. × 5 in.—

	Upper tier.			Lower tier.			
No....	1	2	3	4	5	6	7
	244	332	260	341	378	354	366

Velocities up cowl-shafts from lantern—

200 240 300

24 Oct. 1878.—External temperature at 12, 59°; the room was full; meeting ended at 3.15. Themometers at—

	Lord Mayor's chair.	Prince's bust.	Princess' bust.	Gallery.
At 11 A.M....	60	60	60	60
„ 1 P.M....	61	61	61	62
„ 3.30 „ ...	62	60	60	61

Velocities in outlets from inner lantern—

	Upper.			Lower.			
At 1 P.M....	460	620	390	484	560	550	526
„ 2 „ ...	510	440	530	598	610	450	612
„ 3.15 „ ...	230	286	194	350	380	406	330

The gas-burner in cones at base of shaft, from space between the two lanterns on which cowls are fixed, were put out at two o'clock. Mats were covered over the gratings in the floor; inlets all open.

2 Nov. 1878.—External temperature at 10.30, 42°.

	Inside temperature at				
	11	12	1	3	5.30
At Lord Mayor's Annex...	56	58	—	—	64
Prince's Bust	52	54	—	—	58
Princess' „	50	51	—	—	56
Gallery Annex ...	55	58	61	61	62
Chamber thermometer	55	56	—	—	63

	11	12	2.30	3	5	5.30
In Lantern Light ...	57	61	60	62	64	65

The furnace was lighted at 6 A.M.; four gasaliers and sun-light burning. Most of the inlets were closed, and only four of the exhaust cowls open up to 12 o'clock; at 12 o'clock opened the other three cowls; at 1.15 lighted the gas burners in cones in

shafts from lantern, and in centre shafts of both annexes; at 1.30 six of the inlets opened; the gasaliers were put out; at 2.30 some complained that the Chamber was cold when the burners in all the cones in lantern were extinguished, and two of the exhaust cowls from same were closed. The Usher had been altering the inlets during the meeting, which was a crowded one.

12 Dec. 1878.—External temperature about 32. The meeting was a full one, and a long one, from 12 to 5.15. An official, whose seat is near the centre of the Chamber, at 3 o'clock, said the temperature was very agreeable, and neither too hot nor too cold. There was but one complaint all day; it was at 1 o'clock, that it was rather warm. At 10.30 three of the exhaust shafts were closed, and all the gasaliers were alight.

	The temperature at					
	10.30	12	1	2	3	5.15
Lord Mayor's Annex ...	52	—	—	—	—	61
Princess' Bust	49	—	—	—	—	54
Princes' „	50	—	—	—	—	56
Gallery	56	58	64	66	65	64

We only had access to the gallery during the meeting. At 2 o'clock all the exhaust shafts were opened, and then the gas burners in those from lantern were lighted, and afterwards no complaints whatever were heard; in the gallery we found the temperature very agreeable.

The temperature in the space between the two lanterns was at		And in the dome about ceiling level in the vicinity of the sun-light.
11.30 ...	56°	70°
1 ...	62	74
2 ...	66	77
3 ...	66	76
5 ...	68	76

13 March, 1879.—External temperature about 38°. The Council broke up at 4.30, the thermometer then stood at 64°; there were no complaints all day. The thermometer in lantern at 4.30 was 68°. The one hanging down from it at about ceiling line 67°.

27 March, 1879.—External temperature 40°. One of the aldermen who had carefully noticed the temperature of the chamber, told me that at 12.15 it was 55°; at 2 it was 60°; at 5.30 it was 64°; and said the atmosphere was satisfactory all the day.

Since writing the above I have received the following. While the one is confirmatory of the foregoing Report, the other is in direct contradiction to the results said to have been obtained by the Cowl tests as conducted at Kew, and after which the 'Sham Usefulness of Cowls' was so persistently advertised, to the serious damage of a most important industry, as well as to the great detriment of the interests of the community at large. Almost every house in every town in the Kingdom bears silent testimony to some great error in the conclusion arrived at.

(COPY.)

St. Michael's, Clapham Rise, Feb. 1880.

SIR,—I have the pleasure to enclose cheque in discharge of your account. Rayfield has done his work to our entire satisfaction. With regard to the success of the Cowls it is difficult to speak with absolute certainty in the present almost dilapidated state of the Church: that they do most thoroughly sweep and cleanse the Church of the vitiated atmosphere which used before to poison me well-nigh to the death every Sunday there can be no manner of doubt; the only question is as to their effect upon the draughts, some thinking that they have increased these, while others (and these latter the best judges) are of opinion that they have considerably diminished them. I hope we may see our way to having the inlets made, and then I shall be able to let you know exactly and fully what we think of your simple, and yet admirable and clever, invention, to which I wish all possible success.

(Signed) M. F. BEGBIE.

Hove, Brighton, Feb. 11, 1880.

SIR,—I enclose you copy of notes of the experiments made here with your Patent Cowl. They show conclusively that a given volume of air passing through the annular portion of the Cowl at a velocity of 18.72 miles per hour, will draw through the inside pipe another volume of air which is equal to 29.12 per cent. of the first-mentioned volume.

Yours faithfully,

(Signed) J. B. PADDON.

HOVE, BRIGHTON.

Details of Experiments made with Banner's Patent Cowl.

January 31, 1880.

	Placed in outlet pipe of air vessel.	Placed one inch from outlet pipe.	Placed six inches from outlet pipe.	Placed nine inches from outlet pipe.
	Revlutns.	Revlutns.	Revlutns.	Revlutns.
An Anemometer recorded per minute	820	716	420	200
Equivalent to a velocity in miles per hour of ...	18.63	16.27	9.54	4.55
Air delivered into hopper-mouth of Cowl, an Anemometer placed at the inlet of inside pipe of Cowl recorded	180 160 220	110 130 136	53 53	
Average	186.6	125.3	53	
Percentage on first-mentioned volume.....	26.06	29.8	26.5	

The pressure of air throughout the above experiments was equal to 1.75 inches of a column of water, and was varied by distance from outlet pipe. During the delivery of air under above conditions into the hopper-mouth of the Cowl, the variations in the revolutions per minute were caused by alteration of the position of centre of cowl.

February 7, 1880.—Air was discharged into hopper-mouth of Cowl through a hole in disc fitted over it. All the following experiments were made under precisely the same conditions, except as to initial velocities, which were varied by different pressures.

The results are shown in the following table:—

	Velocity of air in miles per hour.	Revolutions per minute of Anemometer placed at mouth of Cowl.	Revolutions per minute of Anemometer placed at inlet of inside pipe.	Rival percentage of air drawn through inner pipe upon air passed into mouth of Cowl.
No. 1 .	30	1,320	420	31.82
„ 2...	18.72	824	240	29.12
„ 3...	13.77	606	154	25.41

Thus, it is guaranteed that if the wind at roof-level be blowing at four miles an hour, which is only about one-third its average velocity, that fresh air is drawn in at the inlet, if it be properly arranged, and out by the Cowl through any house-drain or soil-pipe in less than one minute.

Nature has a sensible habit of supplying her wants from the nearest point. When this fact is borne in mind it will not be difficult to satisfy ourselves that mere Louvre's, Screws, and Fans, however scientifically placed and guarded, cannot draw or force still air into a heavier atmosphere in motion, and which is pressing for admission at every turn or crevice all round them. E. GREGSON BANNER.

11, Billiter Square, Feb. 1880.

EXTRACTS FROM TESTIMONIALS.

Baron's Court, Dec. 6, 1879.

SIR,—I am glad to give my testimony of the complete success of the system which you have inaugurated at Baron's Court and at my London residence, Hampden House, for the sanitary security of the drains, and I see no reason to doubt its complete success for the future. The system appears to be both simple and effective, and one which is not likely to suffer any derangement. I have to thank you for all the care and attention which was bestowed during the progress of the works, and for the very efficient way in which they were carried out under considerable difficulties here, as to limited time and other circumstances.

Faithfully yours, ABERCORN.

January 16th, 1880.

SIR,—In reply to your letter I have much pleasure in stating that I am quite satisfied with the Banner System of Drainage, and the Ventilation of Drains, Soil-pipes, etc., etc., as carried out at Burghley House. The works have been completed for a considerable time (2½ years), and all appears to be going on satisfactorily.

Your obedient servant, EXETER.

46, Belgrave Sq., Nov. 27, 1879.

In reply to your enquiry I have pleasure in stating that I am quite satisfied with the Banner System of Sanitation, embracing ventilation of drains, soil-pipes, etc., as it has been carried out at my Irish seat, Headfort House, and The Lodge, Virginia. I know that the work at Headfort was a difficult one, as I saw it at various stages as it progressed. I am not only satisfied with the results worked out by your system in a sanitary point of view, but also consider the charge made for the important work as done very reasonable. I feel I have now a security against the ingress of sewer gas into my houses, and consequent illness, which I never before had, although I had incurred from time to time large outlays to effect this most desirable end.

HEADFORT.

95, Eaton Square, Dec. 13, 1879.

LORD ERNE has much pleasure in bearing testimony to the efficiency and thoroughness of Mr. Banner's System of Sanitation. Nothing can be more perfect both in theory and practice than this system when carried out in its entirety. The cause of much unpleasantness and even illness at Crom has now been quite removed, and as far as a year's experience can prove anything he is quite willing to recommend it as a perfect cure, always provided the work is well carried out.

Forest Lodge, Binfield, Dec. 14, 1879.

DEAR SIR,—I am very much pleased with your Ventilating Cowls—there is not the slightest smell anywhere. I have recommended your system to many of my friends, who intend to carry it out. I am, etc.,

WARWICK MOORSHEAD.

Kylemore Castle, December 5th, 1878.

I am quite satisfied with the charges for the extensive works that were necessary in so large a building; and now that the Banner system has been completed here, I wish to say how much delighted I am with it. Like many other great discoveries and inventions, the wonder is that it was not thought of before; and now that you have brought it to practical application, one is surprised at the simplicity with which it can be carried out. Many persons have advocated the ventilation of sewers, etc., and in one way or another everybody has tried to do it. To reduce the formation of mephitic gases to the minimum, and to prevent altogether the accumulation of any gas that may be formed, constitutes, I suppose, the key-note of your system, and admirably it is carried out. I had done everything I could to perfect the drainage and sewerage here; we had elevation of the house, giving plenty of fall, lots of water, and a large tank for a receptacle, pipes went up from every soil-pipe of the closets, the cesspool was also supplied with a ventilating-pipe, carried into the wood, far from the house. All in vain; those abominable D traps in the closets, and the closed drains could not be ventilated by any such devices; but now that openings have been made in them, and your powerful, though simple cowls, have been adjusted to the ventilating-pipes from the closets, I venture to say that there is not, and cannot be, any accumulation of gas, because hardly any gas can be formed, and whatever is formed passes rapidly up, and escapes at the cowls. It is very doubtful whether sewer gas can form at all in pipes and drains ventilated on your system; but it is very certain that if there is any formation, it must find its exit at the top of the building, and be dissipated in the atmosphere, where it can do no harm. My house is now perfectly pure, and I have no doubt we shall escape many evils which fell upon us under the old system of traps, and bottling up of gases, contrary to all the laws of nature. I will only now add that the alterations you designed and made have proved most satisfactory, and that the facility with which they can be inspected and seen to be in order, constitutes a material advantage in the system. MITCHELL HENRY.

Hainton Hall, December 13, 1879.

I was very much pleased by the way in which the Banner System of Sanitation was carried out, with regard to my house and drains, and consider that it was a complete success. E. HENEAGE.

Monk Tower, Lincoln, Nov. 17th.

As far as I have had experience of the Banner System of drainage it has answered perfectly at Osherton, but of course a few months is hardly sufficient test. It appears, however, that it is impossible with such an arrangement for sewer gas to find its way into the house.

F. J. S. FOLJAMBE.

Bedford House, Streatham, Dec. 18th.

The sanitary alterations carried out at my house have given us complete satisfaction, and entirely removed the offensive smells of which we so frequently had to complain before. The system you have introduced seems altogether the most perfect I have anywhere seen.

Faithfully yours, W. GRANTHAM.

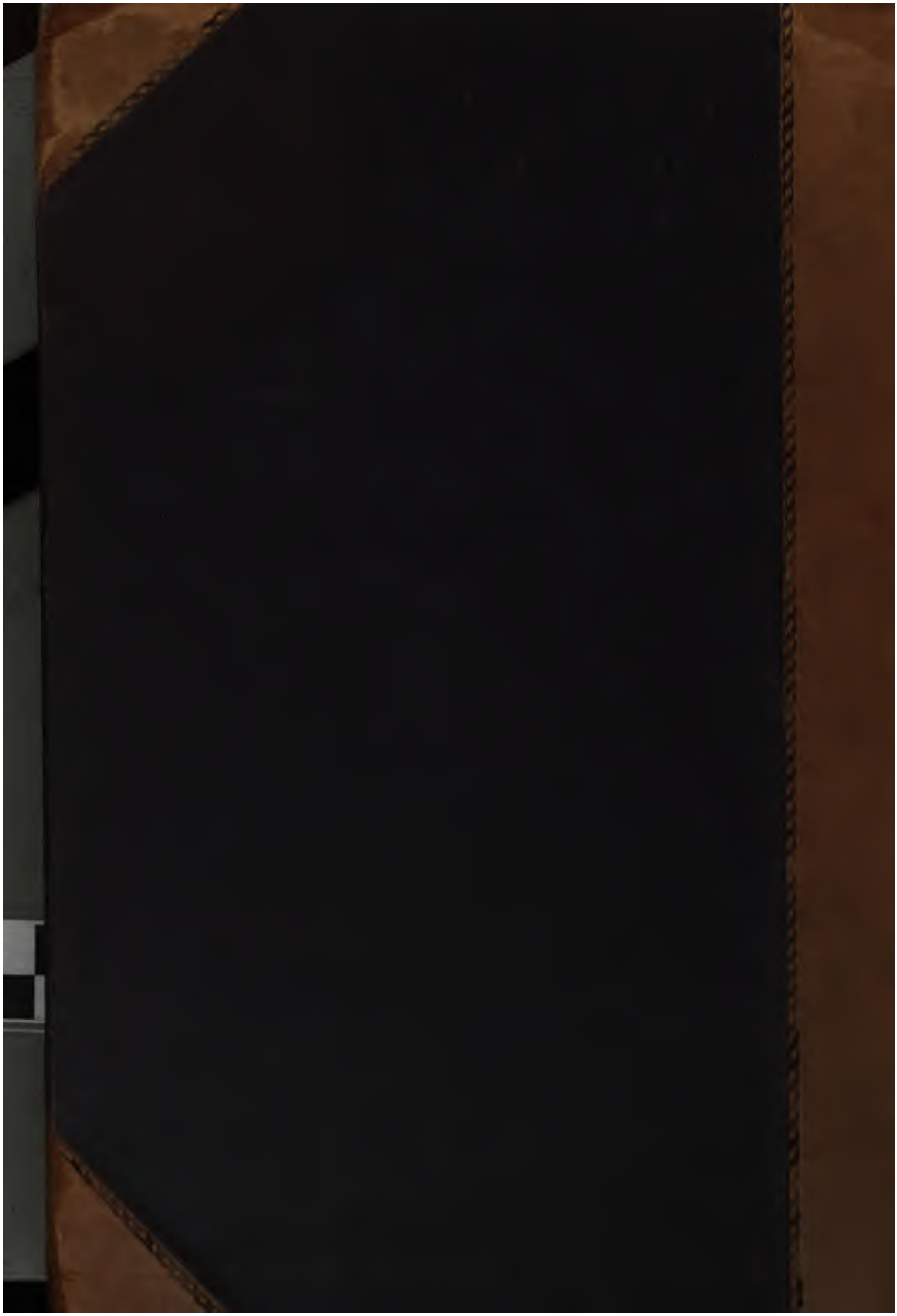
Moreton Pinkney Vicarage, Jan. 31, 1880.

The sanitary work done by you at my vicarage in 1877 has proved quite a success, and I never lose an opportunity of recommending your system. N. D. WHITE.

LIST OF PUBLIC BUILDINGS, CLUBS, BARRACKS, AND MANSIONS,

WHERE THE

BANNER SYSTEM HAS BEEN CARRIED OUT.

His Grace Duke of Sutherland, Stafford House, St. James's
H. P. and Lady Vernon, Hanbury Hall, Droitwich
H. P. and Lady Jenkins, Upton House, Kineton, Warwick
The Earl of Dalkeith
The Baroness Burdett Coutts, Stratton Street, Piccadilly
Sir Daniel Cooper, Bart., Prince of Wales Terrrace, South Kensington
Admiral Sir T. Pasley, Shedfield, near Botley, Hants
Lord Francis Cecil, Stocken Park, Little Bytham, Lincoln
T. Thistlethwayte, Esq., Southwick Park, Fareham, Hants
Captain Lefroy, Itchell Manor, Crondall, Hants
Major Leeds, Ryde, Isle of Wight
Pier Hotel, Ryde, Isle of Wight
Dr. Davey, Ryde, Isle of Wight
Great Northern Hotel, Peterborough
Dr. Newman, Stamford
Uvedale Corbett, Esq., Ashfield Hall, Neston, Cheshire
Major Corbett, Vaenor Park, Montgomery
Charles Lee Clare, Esq., Upper Broughton, Manchester
Rev. W. F. Geldart, Vicarage, Kirk Deighton, York
Mrs. Geldart, Kirk Deighton, Wetherby, York
Lady Cardigan, Oundle, Hereford
P. Le Neve Forster, Esq., Wandsworth
W. T. D. Humphreys, Esq., Miltown House, Shabane
James Macfarlane, Esq., Melmount, Shabane, Ireland
Rev. Dr. Price, the Philberts, Maidenhead
Dr. Montgomery, Maidenhead.
Dr. Waggett, Notting Hill, W.
Dr. Roberts, Greenhill Villas, Hampstead
Dr. Howse, Guy's Hospital, St. Thomas's Street
Radley College, near Abingdon, Oxon.
Radcliffe Library, Oxford
Major Seddon, R.E., Elgin Terrace, Notting Hill
— Brown, Esq., 78, Holland Park, W.
J. W. Gilbertson, Esq., 8, Upper Phillimore Gardens, W.
A. Pfeiffer, Esq., Castlebar, Ealing
S. H. Robeson, Esq., Chaworth Road, Norwood
J. Johnstone, Esq , 52, Gower Street, W.C.
E. Capper, Esq., Shooter's Hill Road, Blackheath
J. C. MacHardy, Esq., 1, Grenville Place, Kensington
A. Bell, Esq., Conduit Lodge, Hampstead
Edward Wood, Esq., 9, St. Alban's Villas, Highgate
Crosby Lockwood, Esq., Highbury Park, N.
Rev. A. Cachemaille, St. James' Vicarage, Muswell Hill
A. Manby, Esq., 54, Bartholomew Road, Kentish Town
Mr. Alexander, St. Leonard's, Tooting
— Hodgkin, Esq., Richmond Hill
S. Fuller, Esq., 85, Inverness Terrace, Bayswater
A. Vickers, Esq., 42, Inverness Terrace, Bayswater
Theophilus Clarke, Esq., Bromley
W. Clarke, Esq., Lapswood, Sydenham Hill
Messrs. Ralli, Bros. & Co., 25 and 26 Finsbury Circus
City Liberal Club, Walbrook, City, E.C.
Guy's Hospital, St. Thomas' Street, Boro'
Middlesex Hospital, Goodge Street, Oxford Street
Royal Ophthalmic Hospital, Chandos Street, Strand
Ryde Infirmary, Ryde, I. of Wight
Bank of England, City, London (Type Room)
London & County Bank, High Street, Kensington
City Bank, Threadneedle Street
Standard Bank Africa, Clement's Lane, City
Chartered Bank India, Threadneedle Street
Scottish National Bank, Nicholas Lane, City
Royal Presbyterian College, Russell Square
Thatched House Club, St. James' Street, Pall Mall
Naval and Military Club, Piccadilly
Jews' Home, Walmer Road, Notting Hill
Cripples' Home, High Street, Kensington
Camden Schools, Prince of Wales' Road, Ca Town
Royal Caledonian ditto, Caledonian Road
St. Vincent's Presbytery, Sheffield
West Herts Infirmary, Hertford
Knightsbridge Barracks, Knightsbridge
Gillett's Bank, Banbury, Oxon.
Co-operative Stores, Victoria Street, City
Ditto, ditto, Chandos Street, Strand
Lambeth Infirmary, Lambeth
Camberwell Union, Peckham
W. Grantham, Esq., M.P., Bedford House, Streatha
W. White Esq., Engadine, Bromley
Scotch Presbyterian Church, Liverpool
Lewis Calisher, Esq., 42 Portland Place, W.
Messrs. Pinckney Bros., Bank, Salisbury
Dr. Longstaff, Southfield Grange, Putney
G. B. Longstaff, Esq., Butterknowle, Putney
Colonel Rose, Orphanage, Northampton
Fire Brigade Station, Holborn
W. H. Kersey, Esq., Wickham Road, New Cross
Arthur Billing, Esq., Peterborough Villas, Fulham R
Messrs. Bevan, Harris & Co., 27 Bishopsgate Street,
Chaplain's House, Guy's Hospital
Dr. Ramskill, Barnes
A. Vickary, Esq., Farringdon Street, New Offices
The Admiralty, Whitehall, Surgeons' Department
S. J. Foljambe, Esq., M.P., Osberton Hall, Worksop
Hospital Wards, Aldershot Camp
Shorncliffe Barracks, Shorncliffe, near Dover
Guard Room, Curragh, Kildare, Ireland
— Renton, Esq., Muswell Hill and Stock Exchange
H. Schwartz, Esq., Denmark Hill
R. Martin, Esq., Denmark Hill
— Wickins, Esq., Tulse Hill
— Wickins, Esq. (Factory), Monkwell Street
— Brandt, Esq., Denmark Hill
H. Heilgar, Esq., Champion Hill
— Jacob, Esq., Lower Norwood
A. Kleinwort, Esq., The Glebe, Camberwell
J. H. Colls, Esq., Grove Park
W. A. Colls, Esq , Grove Lane
O. Dufour, Esq., Herne Hill
— Fleming, Esq., Champion Hill
F. W. Heilgar, Esq., Great St. Helen's, E.C.
Messrs. Eno, Court Road, Dulwich
— Berber, Esq., Champion Hill
Messrs. Jones and Higgins, Drapers, Peckham
— Roberts, Esq., Champion Hill
Colls and Sons, Camberwell Road
— Peat, Esq., Blackheath
Co-Operative Stores, Bedford Street, W.C.
— Druce, Esq., Denmark Hill
Rupert Potter, Esq., Bolton Road, West Brompton
Messrs. Munt and Brown, Wood Street, Cheapside
Messrs. Banner, Brighton, Penge, and Sydenham

And many others.